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EDITORIAL NOTES.

Flouting the Gas Residuals Joint Committee's Report.

IT is our duty this week to invite the serious attention of the gas industry to a condition of things that has arisen in connection with the matter of the restriction of dealings in the residual products of gas manufacture—a matter that it was considered had been finally set at rest by the deliberate findings of the Joint Committee of the two Houses of Parliament who sat at the end of 1912, and who gave a patient and thorough hearing to the whole question.

Before calling attention to the new phases of this matter (we ask the consideration of our readers to the very end of this article) that have been produced and revealed during the last few days, let us briefly sketch the events leading up to the present position. In the session of 1912, the chemical manufacturers began the campaign for the curtailment of the liberty of the gas industry in respect of dealings in its residual products, palpably for the purpose of constituting themselves the sole market for the bye-products of those gas undertakings that do not work up their own residuals, and so setting up an absolute control of purchasing prices. The chemical manufacturers were successful at the outset of the campaign—the matter having been sprung as a surprise upon the gas industry—on the most incomplete evidence and consideration. Before succeeding Committees, the chemical manufacturers (through an organization, with concealed membership, known as the Alkali Manufacturers' Association), with two or three precedents in hand, obtained the insertion of a restricting clause or words in several other Bills and Orders—numbering in all some two dozen. The gas industry was thus the victim of a condition of things that required full, impartial, and judicial consideration; and it was stung to activity by the injustice of what was being done, and by (we cannot refrain from saying it) the somewhat imperious manner of its doing. The representations of the gas industry (after much injustice had been done in setting the ball rolling towards the objective, based upon self-interest and not public interest, of the chemical manufacturers) eventually brought about the appointment of the Joint Committee of the two Houses of Parliament; and after a patient and detailed hearing and consideration, the Committee arrived at the conclusion that it was not desirable that the gas industry should be the subject of restriction in the matter of trading in the secondary products of its manufacturing operations, though the industry should not be allowed to go into the manufacture of chemicals outside those of which their own residuals are the base. This finding showed that what had previously been done had been a mistake; and, being a mistake, Parliament ought to afford the earliest and easiest means of rectification.

What is the result? The first model clauses issued by the parliamentary authorities after the report and findings of the Joint Committee deliberately suggested the limitation of the secondary products business of gas undertakings to the conversion, manufacture, and sale of residuals, and did not say anything about "purchase" and "dealing in." The South Suburban Gas Company were the first to have restriction placed upon them in 1912; they were the first to come back to Parliament in 1914 to ask for the rectification of the legislative error. At the outset, they simply sought the repeal of the restriction, and the restitution of rights possessed under a former Act of one of their now constituent parts. The Alkali Manufacturers' Association petitioned against the proposal; and the Chairman of the Company (Mr. Charles Hunt) and his colleagues thereupon considered whether there was not some way by which they could satisfy the chemical manufacturers, and yet not have continued against them the disability under which they were erroneously placed. The model clauses affecting the matter were considered; and Counsel's opinion was taken (this really ought to have been a matter for the Gas Companies' Protection Association) as to whether the modification of the model clauses deprived those gas undertakings that adopted them of the rights that the Joint Committee had said should be theirs. In the judgment of Counsel (as will be seen from the opinion published in our columns to-day by the courtesy of Mr. Hunt and Mr. Blyth, the Company's Solicitor) the present model clauses do so deprive gas undertakings. The Board of the Company thereupon submitted a clause to restore to them the powers, in terms of the recommendations of the Joint Committee, in respect of their proposed new works' site at Belvedere on the banks of the Thames, leaving the restriction to apply to the Lower Sydenham works, where there is no opportunity to supply a market to other gas undertakings. This was the position when the Bill came before Sir Harry Samuel's Committee last week, from which Committee the Company naturally expected they would obtain justice in accordance with the recommendations of the Joint Committee.

What happened? Through the mouth of Sir Harry Samuel, the Committee claimed that they held in respect of this matter a judicial position quite apart from the Joint Committee—in effect, that they were free to exercise a complete discretion. We hear Parliamentary Committees talk of, and see them guided by, precedent; but we have never heard of nor seen a clearer revolt against the judgment of a Joint Committee appointed for a specific purpose. Despite all the argument of Mr. Vesey Knox, K.C., and the evidence of Mr. Hunt, it looked very much, early in the proceedings, as though the Company were not going to get the offensive restriction removed, even in respect of the new Belvedere site. And they did not get it wholly removed, but only partially. Whether or not there was dissension among the members of the Committee, we cannot say; but the result has the appearance of a sort of compromise for conciliation purposes—the Company being limited in their purchases of residuals to a quantity equalling one-third of their own make. The decision, in view of all that has transpired since the restriction was placed upon the Company, is not of that essential justice that statutory companies expect from the Legislature. In fact, we say emphatically that the decision and the position are nothing short of an insult to the gas industry, and a contemptuous treatment and disregard of the judgment of the Joint Committee of the two Houses of Parliament.

Sir Harry Samuel claimed for his Committee the right to give independent consideration to this matter, and not to be bound by the findings of the Joint Committee. What were the objects of the appointment of the Joint Committee? Firstly, to give the whole question in dispute the consideration that had not been previously accorded to it; and, secondly, to establish a principle for future legislative guidance. If these were not the objects of the appointment of the Joint Committee, then what were they? If these were not the objects of the appointment of the Committee, then the reference to them was, from its very inception, a perfect farce; and their time and that of the chemical manufacturers and of the gas industry, and the money of both parties, were absolutely a wilful and deplorable waste. The Joint Committee were in effect a Court of Appeal specially constituted for the consideration of this particular matter. Their findings established the fact that there had been a miscarriage of justice, and that, without full consideration of all that it involved, a new policy had been set up that was not justified by the circumstances. This decision, if it is worth anything at all—if the whole proceedings are not a piece of legislative travesty—confers upon those undertakings upon whom the restricting clause or words were imposed the right to have it or them annulled, and not to remain with the limitation upon them, and as isolated examples of parliamentary error. Sir Harry Samuel (who, we recall, was Chairman of the Committee that in 1911 imposed

the restricting clause on the Annfield Plain Gas Company) thinks—or rather we ought to say he and his Committee think—otherwise. We altogether fail to see the reason for the appointment of the Joint Committee if their findings were only arrived at to be subsequently ignored, and that without an equally full and minute inquiry.

Naturally, Mr. Hunt and the Board of the South Suburban Company feel that they have been treated very unjustly by the Committee; and the representatives of the gas industry generally will feel this. It is a principle for which the gas industry has been fighting—and fairly won. It is the right to have just as free a hand as traders as the chemical manufacturers who have sought so assiduously, and by every available means, to manacle them, and so prevent the operation of the balancing power of free trade and open markets in fixing the prices for these raw materials. This right—the right the Joint Committee said ought to exist and ought to have effect—the gas industry must protect. There is a strong reason why the industry should make a very powerful protest against this flouting of the recommendations of the specially appointed Joint Committee. We do not want to have all the fighting over again; but the position appears threatening. If words used before Sir Harry Samuel's Committee mean anything, the chemical manufacturers are adopting fresh tactics in this matter; and tactics which, if the printed model clauses do not bear false witness and are not misleading, have already been partially successful. In connection with the South Suburban Bill, Mr. W. Pearce, M.P., in his evidence on behalf of the chemical manufacturers, said they were attempting to get an absolute restriction on every gas company in purchasing residuals. To find out how they are attempting to get this, we have not to look further than a remark made during the proceedings by Mr. Macassey, K.C. He said: "The Association were "seeking to make it obligatory, by means of an alteration in "the Model Bill, and by means of an alteration in Standing "Orders, to have that general embargo imposed on all gas "companies—*i.e.*, that by Standing Orders gas companies "should be prohibited from going beyond the business of "manufacturing their own residual products." What does this mean? It means a rear movement on the part of the chemical manufacturers to flout the recommendations and findings of the Joint Committee. The model clauses of this session, we repeat, look much like a partial success. It comes to this, Are the desires of the chemical manufacturers to have superior effect in statutory enactment to the considered judgment upon complete evidence of a Joint Committee of the two Houses of Parliament?

This is the question which confronts the gas industry to-day; and the time has come—in view of the statements made on behalf of the chemical manufacturers during the proceedings on the South Suburban Bill, in view of the alterations made in the model clauses, and in view of the decision on the South Suburban Bill—to have the question raised in Parliament, by (we suggest) petition and other means, in order to prevent these threatened further attempts to impose a condition which fair and careful adjudication has pronounced to be undesirable. There are other points touching this matter in the proceedings on the South Suburban Gas Bill; but they are subordinate to the main and pressing one, and can, if need be, be discussed should occasion arise.

Exceptional Circumstances and the Calorific Standard.

THE gas profession will have a treble interest in the report, in our "Parliamentary Intelligence" to-day, of the proceedings before Lord Clinton and his colleagues, on the Liverpool Gas Company's Bill, because of the importance of the radical change (in which the Bill takes part) in the statutory conditions of gas supply, because of the fact that the Engineer of the Liverpool Company is this year the President of the Institution of Gas Engineers, and because Liverpool will next month be entertaining the members of the Institution at their annual meeting. There will be, through the Bill now before Parliament, considerable changes in the conditions of the Company, upon which to congratulate the Chairman (Mr. H. Wade Deacon), his colleagues, and Mr. Allen. In policy, the Liverpool Company have occupied a very peculiar position. They are the only Gas Company on this side of the Border that have, until recent years, adhered steadfastly to an unusually high illuminating power gas; but it has been skilful management that, under this, in latter years, uneconomic condition, has brought the Company into such excellent position in regard to low capital expenditure (only £423) per million cubic feet of gas sold, and a low price (2s. 1d. per 1000 cubic feet) for gas of an illuminating power complying with a 20-candle standard. However, the administrators of the Company in recent years have come to the conclusion, under Mr. Allen's advice and guidance, that there is nothing in the conditions of Liverpool, other than the gas supply which they themselves have given the citizens, that should differentiate it from the rest of the country in regard to the quality of the gas supplied. On the contrary, the heavy character of the gas is a positive detriment to the best use being made of the modern means of burning it. It is quite remarkable from the psychological point of view how custom can for a time blind the eyes of men to developments which are potentially destructive of the custom. Custom a time ago clung about the administration of the Company, and impeded progress towards the rational gas for all purposes. Custom, too, after the Company's administration loosened itself from its old traditional policy, caused the City Corporation, at every move the Company made towards the rational state in regard to gas, to try to hold them back, and keep them from supplying the most useful gas to the citizens. The conserving of old conditions in regard to gas supply may be an act—and it positively is in this case of high illuminating power—that is prejudicial to the consumers under modern conditions of use. That is where the want of knowledge on the part of local governors in such matters may in the desire to protect the consumers have, in the result, just the contrary effect.

However, the Company's desire to be released from the illuminating power standard and penal test, and to have a calorific power standard and test in substitution, has been successful, and we heartily congratulate them upon it. The Bill came before Lord Clinton's Committee, whose decision in the case of the Gas Light and Coke Company's Bill (with which decision the Governor of the Company, Sir Corbet Woodall, is fully satisfied) will form the basis for the model to be applied in future. This decision the Liverpool Company, through Mr. Honoratus Lloyd, K.C., expressed themselves willing to accept when their Bill was introduced to the Committee. This ready acceptance, and an intimation by the Committee, at the close of the promoters' case, as to the lines on which they thought a settlement might be effected, completely broke down the contention of the Corporation that the agreement arrived at between them and the Company when the latter secured the "Metropolitan" No. 2 burner was an instrument that should have application in perpetuity. It is unnecessary, in the circumstances of a fresh agreement being arrived at last week, to comment upon a submission that admits of no possibility of a change of circumstances in an industry such as gas supply. However, the intimation of the Committee carried with it an expression of opinion that the Company should also adopt a standard price and a sliding-scale of price and dividend; the Committee being in favour of uniformity of practice being instituted, as far as possible, among statutory gas undertakings. The points of the settlement are therefore briefly these: The illuminating power standard and test are cancelled; but, as in the case of the Gas Light and Coke Company, there is to be testing with flat-flame burners for information only. The standard calorific power is to be 550 B.Th.U. gross, which is 10 B.Th.U. more than in the case of the Gas Light and Coke Company. The margin before the line is reached below which penalties begin is to be 5 per cent., which raises the penal line from the South Suburban Gas Company's 475 B.Th.U. gross, and the Gas Light Company's 499½ B.Th.U., to 522½ B.Th.U. The standard price has been fixed at 2s. 1d. (the current charge) with a neutral zone up to 2s. 4d., so that present maximum dividends are assured and fully protected. The differential price of 6d. per 1000 cubic feet in the added areas is not to continue, if put into force, after ten years. The sulphur compounds clause has also been repealed. The remainder of the Bill, as to extension of area, conversion of capital, additional capital, and other matters, goes through as in the deposited draft.

This is the position; and it is satisfactory to the Company. The decision, however, as to calorific power gives effect to the idea of the Board of Trade that the standard may be varied according to the conditions of the promoting Company; but it does not carry out the suggested and reasonable principle of securing uniformity as to conditions. This is the more vexing point. Lord Clinton, in his state-

ment before the settlement as to what was in the minds of the Committee, said "it is possible the percentage may be "altered." Already in the Gas Light Bill the percentage allowance from the standard was reduced from the 12 of the South Suburban Act to 7½. This reduction, in view of the Gas Light standard of 540 B.Th.U. gross, and the elimination of the three days' average and the substitution of the mean of two tests per day, was carrying the restriction of the margin and liberty farther than was necessary in the safeguarding of all interests. To raise the standard to 550 B.Th.U., and to reduce the margin to 5 per cent., with the average of one day's testing, is drawing the conditions to a very fine point. But this Liverpool case is exceptional, and cannot be taken as a precedent. Exceptional cases were contemplated in the Board of Trade report; and what makes the Liverpool one exceptional is the Company's own history in regard to luminous quality. If the trend of things some years ago (we are not referring to immediate past years) in respect of quality had kept pace with the development of the means of use and the applications of gas, and the progress had proceeded *pari passu* with what was done in connection with other important concerns, the case for any differentiation between the Liverpool Company and the Gas Light and Coke Company would not have had a point in its support. Differentiation in the upward direction, though admittedly not great, is a consequence of the Company's illuminating power policy of years ago, and of its long duration. Therefore, what has been done in the case of the Liverpool Company must be taken not as a precedent, but as a product of exceptional circumstances, and of agreement with the Corporation, following the intimations of the Committee as to the lines of settlement that would be acceptable to them. But this we do say, that, in the circumstances of the Liverpool Gas Company, the agreement is quite satisfactory, though we should have been better pleased not to have seen the lessening of the percentage allowance, and—in view of the reduction of the margin—the further condition, in both this and the Gas Light and Coke Company's case, restricting the average to one day's testings, instead of three days'.

A few words about this last-mentioned point. Second thoughts are sometimes the best. What is the object in reducing the average to a day's double testing? Obviously the protection of the consumer, and to keep the gas undertaking up to the mark in respect of quality. But on close examination, is the restriction to one day really in the interests of the consumers, or in those of penalty hunters? Gas undertakings are not likely to work down closely to the minimum calorific line, so as to imperil the reputation of their gas and of their management of the undertaking. A lapse on a single day will be a matter of accident, and not of design; and what does it profit the consumers that a company is fined for such lapse as there may be on one day? But it does matter to consumers that, on a lapse one day, the Company should send out a higher calorific value gas on the succeeding day or two days to compensate the consumers for the deficiency on the day of default. There will be no obligation upon a company to make restitution in this way after being defaulters on one day, and incurring a penalty. In practice, however, we do not suppose the consumers would notice a small percentage difference either on the day of deficiency or on the day of improvement; and certainly at the end of the account quarter the deficiency and the improvement would be entirely lost in the aggregate of consumption and general quality of the gas during the quarter. We believe in control and the imposing of reasonable obligation upon a statutory company. But we cannot see any utility, but a good deal of futility, in such tight-lacing legislation as we have in this particular point as to the average of two tests on one day.

Extending the Area of Business.

Measured by the returns as to gas consumption increases obtained in this country in the second half of last year, the Imperial Continental Gas Association have good reason to be satisfied with their average of 4·47 per cent. increase over the whole of their stations, though it compares with 6·37 per cent. increase in the corresponding half of the preceding year. It was an abnormal half year on the Continent as in this country, in respect of atmospherical conditions that are not most conducive to its business that looks for its augmentation so largely to consumption of its commodity for heating purposes. However, the gas industry is the fortunate possessor of several strings to its bow; and, as self-preservation is the first law of Nature, and as self-interest is an energizing factor in business, those who administer the industry, where progressiveness holds sway, are directing their energies to the extension of the trading ramifications of their concerns along the lines of least resistance, while not by any means neglecting those lines that require care to preserve the volume of business. We repeat the words "where progressiveness holds sway." It is akin to saying that to-morrow is Wednesday to remark to gas men that the conditions of the lighting business have altogether changed, and that electric lighting competition has to be seriously reckoned with in certain parts of our social constitution. In those parts, competition is keen; in other parts, the mastery in the lighting business rests with the incandescent gas mantle. But withal on the Continent the demand for gas lighting increases, if slowly. The fact of this keen competition, however, causes the administrators of progressive gas undertakings to press forward with greater vigour the development of the other resources of gas supply, with the result that the volume of business extends—in fact, within the cities and towns at home, the business of which the gas industry has been relieved by the competition of the electric light has been more than compensated in two quite separate ways—by the aggregate consumption of the small consumers for lighting purposes, and by the development of the use of gas generally for cooking, heating, and hot-water supply. In these latter respects, the Imperial Continental Gas Association are not by any means averse to saying that this country has given them a long lead. But energies are now being directed, and in no mean fashion, to this work, in order, as the Deputy-Chairman of the Association (Mr. Arthur Lucas) said at the meeting of the proprietors last Tuesday, to make gas "an indispensable item in every house-"hold." The potentialities are great from small appliances up to the large ones, as illustrated by the fact that, "in the "districts of Berlin supplied by the Association, no fewer "than 79,000 gas-irons were sold during the years 1911-3." It is one of the excellent things about the gas industry that the more the scope for business is examined, the greater the possibilities expand; and the stronger becomes the desire to take advantage of all opportunities yet undeveloped.

At one time the administrators of gas undertakings in this country were very content to live serenely under a stay-at-home policy; and it is only within the last few years that there have been marked movements in driving the distribution systems farther afield. There is great activity now in stretching out mains so as to obtain outlying townships as customers. But activity of this kind was part of the policy of the Imperial Continental Gas Association long before it became a matter of ordinary policy and prudence in this country; and it is to this development that—despite the fact that cooking, domestic and industrial gas heating, and hot-water supply lines have not been developed so briskly as at home—the business of the Association has expanded so magnificently. Extension of consumption has been such that, though the supply of cities has lapsed so far as the Association are concerned, the accruing consumption in the other centres of supply has quickly counterbalanced the loss, and then has exceeded it. This work of extension proceeds, as witness the extensions in the second half of last year. In those few months, the borders of the Antwerp system were enlarged by 27 miles of mains; those of the Berlin system, by 20 miles; those of the Brussels system, by 16 miles; those of the Hanover system, by 12 miles; and those of the Flushing system, by 19 miles. This was a distinctive feature of the half year; and it was a good feature. The light, heat, and power agent that gets first possession of the outlying areas is stronger than the second-comer. In the outlying places with sparse populations, gas is the stronger of the two competitors for light, heat, and power—first because copper costs so much more than iron or steel pipes to do a relative amount of work, and gas has intrinsic merits which make its application to a variety of purposes cheaper than electricity. The result of these territorial extensions, combined with the activity in developing the use of gas for purposes other than lighting, is shown by the 10 per cent. increase in consumption at Antwerp during the half year, 10 per cent. at Brussels, and 13 per cent. at Flushing. The increase in business at Berlin was affected by the diminution in the population by 40,000 between February and October last, owing to the migratory tendency which takes hold of all large cities at some time or other. Many people like to go for residence farther afield—farther from the din and bustle

of city and business life. But while in the city between the months mentioned the population decreased as described, the population in the suburbs did not advance by more than 28,000. The same thing has been experienced in London. From the City and some parts of the West-end, the resident population considerably diminished, through people, with the conveniences of rapid transit by rail, tramcar, and motor bus, getting farther out. But a census shows that lately there has been a turn of the tide. So it will, we fancy, be with Berlin. As to the financial outcome of the half-year's trading, proprietors in the Association may consider themselves very fortunate in having issued so well as they did, taking into account all the circumstances, as related in the Deputy-Chairman's speech at the half-yearly meeting.

Scientific Gas Salesmanship.

One of the best papers that has been written lately on the subject of salesmanship as applied to a gas undertaking was the one read at the Leicester local conference of the British Commercial Gas Association on Friday last. The author was Mr. R. J. Rogers, of Birmingham. The reason that the paper is regarded as "one of the best" we have recently read is that it is most comprehensive from the point of need, through the essentials in requirements, to the confirmation of good effect from the policy advocated as experienced at Birmingham. Mr. Rogers urges scientific salesmanship; but we can compliment him upon the fact that he had also a tale to tell which discloses scientific organization, and a thorough knowledge of the necessities of the sales department. If there is one section of any gas undertaking that must to-day have complete and perfect organization, it is the sales department; if there is one section that must have in it men of special and multiform qualification, it is the same department. There is, of course, special training that men for such work require; but unless the men have the aptitude for learning all that is necessary, and possess the collateral qualities demanded by the work, it is no use trying to mould them into good gas salesmen. Gas engineers and managers cannot be all things. We know some wonderfully good gas engineers and managers of works who would make lamentable failures as organizers of a gas sales department and as salesmen of the gas that they so efficiently and economically produce. What is more, in large and medium-sized undertakings to-day, the gas engineer and manager cannot expect to be able, within business hours, to do all that is desirable to maintain the high-grade efficiency that is necessary in all departments. There must be devolution of responsibility into competent hands, under a well-organized system. But of course all gas undertakings cannot afford to bring into being such a perfect sales organization as exists in Birmingham; but every undertaking can try to get as near to perfection as its circumstances will permit. Of this we are convinced, that, though the paper before us outlines the organization and work in a gas sales department which stands in importance among the first dozen in the United Kingdom, there is not a part of the contribution from which the managers of even the smallest gas undertakings cannot draw some "tip" that will be useful, as being advisory, in the matters of qualification, system, and work.

The managers of undertakings with room for a special sales department and a properly trained staff will note the emphasis laid by Mr. Rogers on the necessity for applying scientific business principles to the work; and this is more essential in a department dealing with such a commodity as gas than it is in many other lines of trading. There are deplorable instances to be found of incompetent gas salesmen. They have been met in our travels. Some of them would, we are convinced, be in their proper sphere if they obtained employment as counter hands in shops where the customer knows exactly what he or she wants, purchases it, consumes or uses it, and there ends the transaction. The gas sales department wants something more than men of such limited ability. It wants men in the principal positions upon whom responsibility and a measure of independence in action can be bestowed; and who have the necessary all round qualifications for the work. We are glad to see that, given a man with all the personal attributes for making a good salesman, Mr. Rogers, in more than one part of the paper, insists on a technical training for him—in fact, he places this as the "first and foremost" condition. Technical training is what so many salesmen lack; and it is a pity. Without technical knowledge on the part of the salesman, the efficiency of the department for its purpose is largely lost. There is a lot of advisory work to be done among builders, architects, and others, by a man who has been trained in the workshops, and who knows what is wanted for a certain position and for certain work, from a piece of tubing up to a gas-engine or a gas-furnace, or a large water-heating installation. The boundaries of the knowledge of some salesmen are fixed by the information given in the catalogues of apparatus makers; and where such limitations exist—well, it is a bad job for the gas undertaking, and for the strength of its competitive position.

In one place, Mr. Rogers utters a warning. He says: "Care should, however, be taken to ensure that inspectors "and other non-technical men who are likely to be asked "questions by the public should not enter into technical "questions in any detail, or advise a particular type or size "of apparatus, but they should respectfully inform in-"quirers that a specialist will call and give them the in-"formation they require." We agree with Mr. Rogers in this matter up to a certain point. An inspector should, in our opinion, be trained to give intelligent answers on technical matters, and not have to go off with the consciousness that he is regarded by the consumer as a fool, or as a dare-not-open-your-mouth member of a well-developed and despotic system of red-tapeism. There are consumers who object, when they have asked one gas official a question, to being threatened with a visit from a second one to give them the answer. We do not want the householder's notions of the methods of the plumber and his mate to begin to cluster about the work of the gas sales department. If the technical point on which information is required is a big one, or the advice sought needs a "specialist," then Mr. Rogers is right. Inspectors, as well as the salesman proper, should have an amount of technical training to render to the sales department the most efficient service among the consumers, and they also require discrimination. With this as a quality, the point made by Mr. Rogers will be gained. We are afraid that it is rather a difficult matter to "ensure" that gas inspectors will not open their mouths; the best thing to "ensure" is that, when they do open them, what comes out will be of advantage to the department.

Those responsible for the administration of gas undertakings should sit down and make from Mr. Rogers' paper a catalogue of the work that there is to be done by a gas sales department; and it will be seen that, if no opportunity is to be lost, the list is a substantial one, and that the advice concerning the various items in the list is good. On the question of policy, the simple hire system of business-getting has a strong advocate in the author; and the results of the Birmingham policy are particularly worthy of note. Being Birmingham, the question of high-pressure gas supply for industrial use has, it may be remarked, quite properly a place in the paper.

Main or Service-Pipe?

We suppose it would not be respectful to flatly refuse to accept now the legal view that the 2-inch pipe laid by the Chesterfield Gas and Water Board in a certain street for the supply of a foundry in the district of the Whittington Gas Light Company is not a contravention of a prohibition resting upon the Board from extending in the district of the Company their mains, which prohibition does not extend to "service-pipes" in certain parishes. Mr. Justice Eve, last December, decided that the pipe in question was not a main, though it is the part of the distribution system of the Board which conveys gas into the street in question from the source of supply. In the "Journal" for Dec. 16 last, we gave reasons for dissenting from the decision of Mr. Justice Eve; and notwithstanding that the appeal of the Whittington Company has been dismissed by the Master of the Rolls, we even now cannot reconcile the legal rulings in this particular case with Lord Selborne's interpretation of "mains" and "service-pipes," nor with what the terms connote to the engineering mind. A gas "service-pipe," 264 feet long, costing £20 16s., and running up a road from a main crossing the end of the road, is a monstrosity that will cause many engineers to wag their heads in disapproval of the profound views of the Court of Appeal and of the Court below. In such matters, however, it is the decision of the Court, not the opinions of engineers, that rules; and so the Chesterfield Board will retain the custom of the foundry in question, through this remarkable thing that the law calls a "service-pipe."

PERSONAL.

Mr. J. S. WATTS, of the Chemical Engineering Company, has been appointed Assistant to Mr. James Armstrong, the Manager of the Ilfracombe Gas Company.

Mr. J. H. POULSON, Assistant-Engineer at the Nelson Corporation Gas-Works, has been appointed to a similar position at Stafford. Mr. J. H. CLEGG, junior assistant in the engineering department at the same works, has also left Nelson on his appointment to the office of second assistant to the Aldershot Gas Company.

Mr. W. J. BARKER, who has been in the service of the Northampton Gas Light Company for over 21 years, has been appointed Manager at the new Oxford Street premises of the Davis Gas-Stove Company, Limited. Mr. Barker, whose organizing abilities have manifested themselves in many directions in Northampton, began work with the Gas Company in the general office; but he was speedily promoted, and eventually became Superintendent of Lighting and Controller of the Fittings Department. Since he was given this post in 1908, the business of the undertaking has made great strides; and there have been many notable developments in connection with the show-rooms and the fittings department.

Marriages.—The wedding of Mr. Arthur E. Johnson, the Secretary of the Brentwood Gas Company, to Miss Dorothy J. Kidd, of Halstead, took place at Halstead Church last month. Among many handsome presents received, was a four-hundred day striking clock from the staff and employees of the Company. The wedding of Miss E. L. Taylor, the youngest daughter of Mr. F. C. Taylor, of Franklin, took place last Saturday week, when the Directors and employees of the Gas Company made some very handsome presents. The same day a son of Mr. P. O. Cannon, of Haywards Heath, was married to a Cuckfield lady. The wedding gift of the gas-works staff consisted of a beautiful oak chiming clock.

OBITUARY.

Mr. CHARLES LAWLER, J.P., whose death has occurred at Rathmines (co. Dublin), was formerly well known as Chairman of the Alliance and Dublin Consumers' Gas Company—an office he held for several years.

The death occurred last Wednesday, at Newquay, in her 67th year, of Mrs. MARIANA STANLEY STEVENSON, widow of Mr. George Ernest Stevenson, the Chief Gas Engineer of the Manchester Corporation, who, it may be remembered, unfortunately lost his life in the explosion at the Rochdale Road Gas-Works towards the close of 1899.

It is with much regret that we announce the death of Mr. J. G. WATKINSON, the principal of the old-established house of Messrs. J. & W. B. Smith, of Farringdon Road, E.C. His death occurred quite suddenly from heart strain. He was at business as recently as last Saturday week, and apparently was in good health and spirits. He was, however, taken ill the following Monday morning and succumbed to a violent attack of sickness early in the afternoon. Mr. Watkinson, who was 58 years of age, was of the best type of successful business men. He had no ambitions for public life, but devoted himself entirely to the building-up of his own business. He was an indefatigable worker, and inspired the utmost loyalty among his large staff of employees. The business of the house was considerable when he took charge of it twenty-five years ago; but it developed amazingly under his able direction, and his realizations of the possibilities for incandescent lighting. He was scrupulously fair and just; and not the least proof of this was the good relations that always prevailed between master and man in the establishment of Messrs. J. & W. B. Smith. Mr. Watkinson was born at Sheffield (where his father was in business as a hardware merchant) and educated partly in England and partly in Hamburg. Upon completing his education he entered a well-known firm of glass manufacturers in Birmingham; afterwards joining William Bailey Smith as partner, and subsequently purchasing the concern outright. The funeral took place at St. Marylebone Cemetery, East Finchley, yesterday (Monday) at noon.

Wales and Monmouthshire District Institution of Gas Engineers and Managers.—A meeting of this Institution will take place in the Gas Offices, at Cardiff, on Wednesday, the 27th inst. The business will include papers by Mr. E. H. Clarry, of Cardiff, entitled "Notes on Condensation and Wet Purification," and by Mr. W. C. Jackson, "A Few Notes on Gas Sales." Afterwards the Grangetown Gas-Works will be visited.

Southern District Association of Gas Engineers and Managers.—The Association will visit Norwich, the home of their President (Mr. Thomas Glover), for their spring meeting, on Thursday of next week, the 21st inst. The programme includes visits to the St. Martin-at-Palace and the Bishop Bridge Gas-Works, the Cathedral, and the Norwich Castle Museum. At luncheon, the members will be the guests of the British Gaslight Company, and they will take tea with Mr. and Mrs. Glover.

NOTES FROM WESTMINSTER.

BETWEEN Monday and Friday of last week some matters of importance to the gas industry issued from the Parliamentary Committee Rooms.

The Calorific Standard and Test.

The question of the calorific standard and test was almost the only one discussed in connection with the Liverpool Gas Company's Bill, which is to confer several new powers of value to the progress of the concern in the interests of consumers and stockholders. If no untoward incident occurs during the further course of the Bill through Parliament, the limits of supply of the Company will be extended, further capital will be authorized, the consolidation and conversion of the capital will be provided for, the illuminating power standard and test will be superseded by a calorific standard and test (though there will be testing by flat-flame burners, as in the case of the Gas Light Company, for information only), the sulphur compounds clause goes, and, as an item in the settlement of the new standard, a standard price and a sliding-scale of price and dividend will apply. It is to the credit of the Company, to that of the Chairman (Mr. H. Wade Deacon, J.P.), and of the Engineer (Mr. Edward Allen), as well as of the other witnesses called on behalf of the Company—Sir Corbet Woodall, D.Sc., Mr. A. Edwards, Mr. E. H. Stevenson, and Mr. Samuel Glover—that at the end of the Company's case, Lord Clinton made an intimation as to the views of the Committee which brought the Corporation and the Company together, and resulted in a settlement which seems to have pleased everybody. This being the case, there is no need to run over the points of the evidence, nor the lines that the opponents indicated that they were taking. That enemy to himself, the poor flat-flame user was, of course, brought up, only to be knocked down again by the weight of the material argument that is brought against him. The power user was introduced on an insufficient knowledge as to the detriment that a heavy gas is to him, owing to the difficulty of securing thorough aëration, and therefore the most efficient explosive mixture. The Liverpool Gas Company have been in the habit of supplying a heavy gas of high illuminating power, which they have of late years admitted is wasteful and not the most useful, and have been directing their attention, with a Corporation at their elbow always objecting to the reduction. How little a high illuminating power gas is now required is shown by the fact that, during the great coal strike, the Company, for economy's sake, reduced the illuminating power to 13 candles, and there were no complaints. However, the Company have now succeeded in obtaining sanction to the supplying of gas that will be most useful to the citizens. The conditions are more stringent than in the case of the Gas Light and Coke Company, but not to a degree that will be a disadvantage to a Company who have been supplying such a gas as that which has obtained in Liverpool. The standard is 550 B.Th.U. gross, with a 5 per cent. margin below which penalties start. The same Committee fixed for the Gas Light Company 540 B.Th.U. gross, with a margin of 7½ per cent. The differences are discussed in our editorial columns. The standard price is the low one of 2s. 1d.; but protection is given to the stockholders by a neutral zone being fixed up to 2s. 4d. The lower price is the one at which the Company have been supplying their high-grade illuminating power gas. The Committee later on assented to an application, made by Mr. Jacques Abady on behalf of the Hightown Gas and Electricity Company, for the same calorific standard as had been fixed for Liverpool—Counsel remarking that "the Company might have to take a supply in bulk from the Liverpool Company, and it would be as well to have the same quality gas." But, generally speaking, the terms fixed in the case of the Gas Light and Coke Company are the ones that will apply to most of the measures this session—promoters bearing in mind the view of the Board of Trade that the standard itself (other than the attaching conditions) should be considered separately for each gas undertaking.

Reappearance of the Chemical Manufacturers.

The Bill of the South Suburban Company was before Sir Harry Samuel's Committee on Monday and Tuesday. The principal part of the Bill has reference to the purchase of a site for new works at Belvedere, in order to give the Company the transport conveniences of the River Thames, as soon as the condition of the works at Lower Sydenham and the increase in business demand new works. This part of the Bill has gone through; but the Company relinquished the proposed powers regarding electricity supply in bulk or for power purposes, though this is not, in their circumstances, a matter about which there is any occasion to make a point. The feature of the proceedings was the reappearance of the Alkali Manufacturers' Association in opposition to the Company realizing any benefit from the decision of the Joint Committee appointed by the two Houses of Parliament to determine the rights of the gas industry in the matter of general trading in residual products. The Joint Committee, as is well known, considered that there should be no restriction, but that, within the limits of the products customarily worked up from residuals, the gas industry should have perfect liberty in trading, without trespassing further into the realms of chemical manufacture. The proceedings and result in

this connection on the South Suburban Company's application are the subject of comment in our editorial columns; and, therefore, important as the subject is to the gas industry in respect of the principle for which they successfully fought, brief allusion will here suffice. When the Company's Bill was originally drafted, they asked for the repeal of the embargo placed upon them, in 1912, at the instance of the chemical manufacturers. In view, however, of the petition of the latter, the Company determined to introduce a clause giving them power, in terms of the Joint Committee's decision, to deal in residuals so far as the new land at Belvedere is concerned—leaving the restriction in force in respect of the Lower Sydenham works, at which, and in connection with which, there is no opportunity for doing more than treat the residuals there produced. The new "model" clause, it was felt by the Chairman (Mr. Charles Hunt) and his colleagues, was only a variant of the chemical clause; and so was of no use to any gas undertaking in the upholding of trading freedom in residual products. In this they were confirmed by Counsel's opinion, reproduced elsewhere in this issue.

At Work Behind the Scenes.

From the examination of Mr. Charles Hunt, the statements of the Chairman of the Committee, and the remarks of Mr. Macassey, K.C., for the chemical manufacturers, as well as of his witness (Mr. W. Pearce, M.P.) there are certain points that stand out clearly. The first is that, notwithstanding the definite objects of the appointment of the Joint Committee, Sir Harry Samuel declined to admit that the decision of the Committee should interfere with the judicial power of his own Committee. In other words, that the whole matter, if he so chose, should be fought over again, notwithstanding the large and broad investigation made by the Joint Committee. A further clear point is that the chemical manufacturers have not relinquished their efforts in this connection. Mr. Pearce candidly admitted that they are still attempting to get "an absolute restriction" on every gas undertaking in purchasing residuals—obviously so as to place the ruling power in the matter of purchase and prices in the hands of the chemical manufacturers. Their absolute purchasing power could only have one result. Mr. Macassey let "the cat out of the bag" as to the fresh methods the alkali manufacturers have adopted in trying to gain their ends. They appear to be as resourceful as the militant suffragettes, and confessedly are at work behind the scenes. Learned Counsel stated that their new action is through alterations in the Model Bill and Standing Orders, by which alterations gas undertakings, they hope, will be prohibited from going beyond the business of manufacturing and selling their own residual products. This is a point that is editorially discussed in earlier columns. The result of the argument before Sir Harry Samuel's Committee was that the full liberty the Joint Committee in effect said the South Suburban Gas Company, with other gas undertakings, ought to have in the matter of residuals dealings was taken from them, and their power of purchase in any one year was restricted to one-third the amount of their own production. This cannot and must not be accepted as a precedent by the gas industry. The Committee also intimated that they would report to the House: "That it would be advisable, in order to test the relative proportion of profits in gas undertakings from the supply of gas pure and simple and from residual products, that the market price on the day of purchase of residuals from other gas undertakings should be inserted in the profit and loss account." We cannot treat the idea seriously. The market prices of residuals (as Mr. Hunt pointed out) vary from day to day; and not only so, but vary between chemical manufacturer and chemical manufacturer—a factor in the fixing of prices by the manufacturers being whether the gas undertaking with which business is proposed has any other outlets for the disposal of its produce. If it has not, then low prices. However, we will not say more here; but leave the matter with the comment that appears in other columns.

Friendly Relations with Local Bodies.

Gas companies being *quasi* public undertakings, it is the right thing for them and public bodies to be on terms of amity, and mutually anxious to work for the local good, while not ignoring the rights of shareholders and other people who may be concerned. The little Edenbridge Gas Company provide an illustration of the value of giving reasonable satisfaction to local authorities when a Bill is being promoted in Parliament; because, this having been done (the authorities representing the local interests generally), if small bodies of residents come along and raise objections Parliamentary Committees are not inclined to listen sympathetically, except on questions specially affecting those private persons as distinguished from those common to all consumers. Briefly stated, the Edenbridge Company is a non-statutory one, with only £5000 capital and £1500 loan; and they are now applying for incorporation. Though formerly the Company do not appear to have done very well, they have prospered of late years. They therefore believed the time had come (and support was given to this by their adviser Mr. Andrew Dougall) when they should obtain full statutory powers, and extend their wings. By consultation, agreement was effected with the local authorities; the principal concession being a reduction of the amount of the capital powers sought. Opposition by local residents was directed to a contemplated inclusion of a large area outside the existing district of supply; the opponents being mostly consumers possessing property within 300 yards of the Company's works—their chief objection being to the enlargement of the works for the supply of the district outside Edenbridge. The expert called on their behalf was Mr. Arthur Valon; and the evidence he gave was very fairly put, and was not of that tar-them-as-black-as-you-can order of which one occasionally has specimens in the Committee rooms. It was practically admitted on behalf of the promoters that the supply of the outer districts would not immediately be of a paying character. For the objectors, Mr. Valon said it would not be for many years—perhaps never. If this should be so, the Company are not likely to extend their manufacturing works to any considerable extent. However, the Committee eventually decided to reduce the term (after which the Company were not to oppose any one else applying for power to supply) within which the outer districts are to be supplied from five to three years, and provided that all the capital powers required for the supply should cease at the end of three years, in regard to any part of the outside area not then supplied. As the Company had used these areas to support a rather large demand for capital, the decision leaves them with only £3000 for future extensions in Edenbridge. In addition, the opponents objected to a provision that the Company were not to be obliged to erect a testing-station unless required by the local authority; their argument being that, as consumers, they had the right to have a gas examiner appointed if the local authority did not themselves appoint one. But, in the result, no amendments were made in the Bill other than those already intimated. It seems likely that the Committee ignored the objections raised in view of the Company having settled with the District Council.

Surprise Tests.

In dealing last week with the surprise testing of Manchester gas, it was intimated that the tests quoted were not made at the instance of the Gas Light and Coke Company. This intimation was due to a misinterpretation of a casual remark; and the published statement may have induced readers to think that the quoted results of the surprise tests were obtained through a neighbouring gas undertaking. This was not so. Some people say they cannot see why a gas engineer, who is going to give evidence against a gas project, should be informed when private tests of his gas are going to be made, as this would spoil his cross-examination. The object of making the tests is to get information against the engineer in question, and not in his favour; and therefore, as a matter of courtesy and fairplay—no matter who makes the test, no matter the tester's reputation for care—the engineer should be allowed time to send someone from his office to check and witness the tests. We do not like the idea of surreptitious testing, because the results would not be produced if they were in favour of the engineer responsible for the supply of the district. If a representative of the gas engineer were present, and could not deny that the tests were unchallengeable, then so much the worse for the gas engineer.

No Compensation for Officers.

When gas-works are to be transferred to a local authority, it is a recognized thing that provision should be made for officers who, having served the company for a number of years, are not required under the new *régime*. The question was raised when the Porthcawl Purchase Bill was before the Earl of Plymouth's Committee last week; the Bill being the outcome of an agreement for sale when the Gas Company were themselves before Parliament. On the general point of the compensation of officers, we agree with Mr. E. H. Stevenson that it is improper that officers of an acquired undertaking, through no fault of their own, should be cut adrift without compensation. Provision of the kind should always be made, because, despite the statement of Mr. Frank Jones that he has an objection to compensation clauses, it is not always possible for a man who is thrown out of office to obtain employment immediately, and he may be of an age when he cannot secure fresh employment at all, or of equal value to that of which he is dispossessed. Mr. Jones is a Director of the Wandsworth, Wimbledon, and Epsom Gas Company. It would be interesting to know whether his objection to compensation clauses led him to vote against the compensations paid on the amalgamation of the three Companies. The Committee refused to insert the compensation clause in the Porthcawl case; but it is pretty evident that their decision was not based on the question of principle, but on what they believed was the understanding at the time negotiations for transfer were in progress.

Professional Auditing.

The London Association of Accountants are not meeting with success in their campaign to get equality of parliamentary recognition with the two corporate bodies who have long been known to Parliament. In the Hightown Bill, the Association got the promoters to expunge the names of the Institute of Chartered Accountants and the Society of Incorporated Accountants, and to leave the auditorship open to the competition of the three bodies. But the promoters received a rebuke from Lord Clinton for their action, seeing that the alteration had been disallowed before; the result being that the two recognized bodies had been put to the trouble and expense of being represented by Counsel against the alteration. Much the same thing occurred in connection with the Edenbridge Bill. Previous comment in these pages has been in favour of the course that has

been taken in connection with the retention of the names of the Institute of Chartered Accountants and of the Society of Incorporated Accountants. Gas undertakings require fully competent and responsible men for their financial auditing, and in connection with the special purposes fund clause; and the assurance given of this by membership of the two bodies is sufficient.

Modern Roads and Subterranean Tenants.

We all know that modern roads are more expensive to break up and repair than roads that were constructed in other days and for other traffic. The Middlesex County Council are proposing to expend over half-a-million sterling in constructing the new Western Road out of London; and it is to be a road of special build and surface for modern traffic. Naturally the Council do not desire the surface of such a road to be interfered with any more than can be helped. But such roads and their longitudinal environment require gas and water; and such roads, too, must have pipes running across them for the supply of other roads. When the Bill which is to authorize this improvement was before the Committee presided over by the gallant Col. Bathurst, the Brentford Gas Company and the Metropolitan Water Board were there to protect their interests. Sir Corbet Woodall and Mr. A. A. Johnston, the Engineer of the former Company, were present, and supplied the Committee with evidence which assisted them in arriving at their decision. The Council are to make such arrangements that in the new road the usual occupants of the subsoil are to find accommodation under the footpaths, and any cross tunnels that the Council are desired to make by the pipe or wire owners are to be constructed—any additional cost to which the Council are put by such construction being refunded to them by such owners. The decision, *primâ facie*, does not appear to be an unfair one.

The Northumberland Clause.

The Alliance and Dublin Consumers' Gas Company have not been granted the electric light powers that they sought in respect of Kingstown, Blackrock, and Dalkey; but the Dublin Southern Electric Supply Company have in respect of Kingstown, subject to the Kingstown Corporation having the right, on conditions, to take over the powers. Two points are worth mention. In the course of his examination, Mr. F. T. Cotton was questioned on the subject of the article headed "The Concealed Report" that appeared in the "JOURNAL" for April 14; and he stated that we [that is to say, the "JOURNAL"] had never seen the report. The vision and knowledge of Mr. Cotton are really remarkable. Regarding the successful Order, and in anticipation of the Corporation taking it over, the Gas Company desired the insertion of the Northumberland clause. They got it. We like in this connection the observation made by the Chairman of the Committee (Sir Edwin Cornwall): "It is a very proper application for the Gas Company to make. I can quite understand if there is any charge to be put on the rates, people who are rated as the Gas Company are are entitled to some consideration." There are some members of Parliament who have something to learn from Sir Edwin Cornwall.

As representatives of the Dublin Corporation, Mr. Michael J. Buckley, M.Inst.C.E. (the City Surveyor), and Mr. H. F. Cotton (the Lighting Superintendent) have been in London during the past week making a study of the public lighting. Under the guidance of Mr. W. J. Liberty (the Lighting Inspector of the City of London), they have examined all the most up-to-date systems to be found in the Metropolitan areas—especially the centrally-hung high-pressure lighting in the City, and the low-pressure gas lighting.

At the Friedrich Krupp mines at Hanover and elsewhere may be seen the Von Bauer bye-product coke-oven, among the features of which are the introduction of steam to obtain a higher yield of gas, ammonia, and tar, the coking of non-fusing or expanding coal, the small dimensions of the chimney and the heating flues in the oven, and the application of the heat in such a manner that the coal at all levels of the charge, from the roof of the oven to the bottom, is in the same state of carbonization during the entire coking period. The gross return of bye-products per ton of coal is stated to be 21s. 3½d.; the cost of coal containing 70 per cent. of carbon and 30 per cent. of volatile matter being given as 10s. 5d. a ton.

We have received, from the Bureau of Economic Geology and Technology of the University of Texas, Bulletin No. 307 (No. 35 of the Scientific Series). It is a bulky pamphlet of about 250 pages devoted to the subject of the fuels used in Texas; the authors being Messrs. W. B. Phillips and S. H. Warrell. The reason given for the publication of the pamphlet is the fact that, while there are very large supplies of good and cheap fuel in Texas, they are not being utilized to the best advantage. The authors say the production of coal, lignite, natural gas, ordinary and producer gas, and petroleum does not begin to keep pace with current demands nor to promise well for the future. The workable coal area in the State is 8200 square miles, with a possible addition of 5300 square miles. The original supply was about 8000 million tons; while the production since 1895 has been 13 million tons only. There is consequently room for great development. Some of the contents of the pamphlet which are of special interest to "JOURNAL" readers may be noticed on a future occasion.

THE RESIDUALS RESTRICTION.

Counsel's Opinion on the Model General Purposes Clause.

IN the course of the proceedings on the South Suburban Gas Company's Bill before Sir Harry Samuel's Committee, in one of the speeches made by Mr. Macassey, K.C., who, with Mr. J. D. Fitzgerald, K.C., represented the Alkali Manufacturers' Association in the attempt to frustrate the Company from getting (in accordance with the decision and recommendations of the Joint Committee of both Houses of Parliament) release from the "chemical clause" imposed upon them in 1912, he made this remark:

> The Association were seeking to make it obligatory, by means of an alteration in the Model Bill, and by means of an alteration in Standing Orders, to have the general embargo imposed upon all gas companies—*i.e.*, that by Standing Orders gas companies should be prohibited from going beyond the business of manufacturing their own residual products.

The report of the Joint Committee contained, *inter alia*, the following:

> They consider further that one gas undertaking should be allowed to purchase the residuals of other gas undertakings, in order to manufacture other products of the same kind as the purchasing undertaking is manufacturing from its own residuals.

Despite this, in the Model Bill issued for the current session, the general purposes clause was framed in the following form:

> The Company shall be established for the purpose of manufacturing and supplying gas for lighting, heating, motive power, and other purposes within the limits of this Act, and may convert, manufacture, and sell all residual products resulting from the manufacture of gas and generally may carry on the business usually carried on by a gas company.

A somewhat similar draft of clause appears for local authorities' Bills. It will be observed that the clause deliberately stops short at the point as to purchasing and dealing in residual products, which the Joint Committee considered desirable in the general interests. Now in view of Mr. Macassey's statement, was this change in the Model Clause (which distinctly overrides the decision of the Joint Committee who were appointed expressly to consider and advise as to the right course to take in this matter of free trading in the residual products of gas manufacture) made at the instigation of the chemical manufacturers? It would be interesting to know, because if the desire of the chemical manufacturers is to have precedence of, and weight over, the recommendations, after thorough consideration, of a Joint Committee of both Houses of Parliament, then the appointment of the Joint Committee was a piece of folly and a waste of valuable time and of much money.

When the Chairman (Mr. Charles Hunt) and Directors of the South Suburban Gas Company were considering the question of asking for the repeal of the Chemical Clause as imposed upon the Company in 1912, the point arose as to the best form of giving effect to their purpose. The new model general purposes clause, which contained the words "may convert, manufacture, and sell all residual products," and not anything about purchasing and dealing in, did not appear to the Board to cover the decision of the Joint Committee; and they therefore instructed their Solicitors (Messrs. Blyth, Dutton, Hartley, and Blyth) to take Counsel's opinion on the subject. Counsel consulted was Mr. P. Ogden Lawrence, K.C.; and in the case submitted to him were the following questions.

QUESTIONS SUBMITTED.

The Gas Company desire to be advised by Counsel whether, if they take their manufacturing powers in the form of the clause in the Model Bill, and in particular whether under the clause in that form they could

(1) Buy whether from gas undertakings or elsewhere the materials required to work up the Company's own residuals;
(2) Purchase the residuals of other gas undertakings, in order to manufacture other products of the same kind as the Company is manufacturing from its own residuals but subject to the qualification made in the Joint Committee's report; and
(3) Buy from other gas undertakings or elsewhere materials required to work up the purchased residuals.

COUNSEL'S OPINION.

Counsel's opinion (which we are enabled to publish through Mr. Hunt's kindly complying with a desire on our part to give the gas industry generally the benefit of it) is as follows

The relevant words are to be found at the end of section 16 in page 71 of the Model Bill for 1913—viz.,

> "and may on the said lands convert and manufacture residual products resulting from the manufacture of gas."

I assume that by these words it was intended to confer upon the gas authority power to

(*a*) Convert the residual products resulting from the manufacture of gas (*e.g.*, ammoniacal liquor) from their raw state into other substances (*e.g.*, sulphate of ammonia); and

(*b*) Manufacture other substances (*e.g.*, sulphate of ammonia) from residual raw products resulting from the manufactnre of gas (*e.g.*, ammoniacal liquor).

If I am right in my assumption, it will be observed that the wording of the power is inartistic and incomplete, and, of course, does not expressly authorize the gas authority to purchase any of the three classes of materials mentioned in the case and in paragraphs 9, 10, and 11 of the joint report.

The question then remains whether the purchase of such materials is impliedly authorized by the power conferred. The power is expressed in such vague language that, if it were divorced from its context, it would probably be held to impliedly authorize the purchase both of residuals for the purpose of treatment and also of materials necessary for the purpose of treating residuals.

Having regard, however, to the context in which the words in question are to be found, and to their position at the end of section 16 of the Model Bill, I think that it is extremely doubtful whether the Court would not hold that the power was confined to enabling the gas authority to work up its own residuals, in which case it would not, in my opinion, authorize the purchase of residuals from other gas manufacturers, nor materials for working-up any residuals other than those produced by the gas authority in the manufacture of their own gas.

I observe that the South Suburban Gas Company's Bill (1914) also avoids conferring express power upon the gas authority to purchase the materials mentioned in the case (see section 37). In my opinion, the words used in that section are open to a similar objection to the words used in section 16 of the Model Bill, and might well be held to be confined to the working-up and dealing with residuals resulting from the manufacture of gas by the gas authority itself.

Of course, the words of section 37 are much better for the gas authority than the words in section 16; but I cannot help thinking that, in order to place the matter beyond doubt, it would be preferable (especially now that the question has to be raised between the chemical trade and the gas authorities, and the Joint Committee have come to a conclusion upon the question) to confer express power upon the gas authority to work up and convert residuals (whether resulting from their own manufacture or purchased from other manufacturers) from their raw state into other substances, and to disposing of and dealing in the substances so manufactured, together with power to purchase residuals from other gas manufacturers, and also to purchase from whomsoever they think fit any materials required to work-up any residuals intended to be treated by them. To this power should be added a proviso in the terms of paragraph 12 of the joint report.

If such a method of dealing with the matter as I have indicated were adopted, it would place the matter beyond doubt, and be the most satisfactory method of disposing of the question. If for some reason, however, this is not feasible, I am of opinion that the gas authority should adhere to the wording contained in section 37, and should even endeavour to extend such wording so as to make it clear that the power to treat residuals is not confined to the residuals resulting from the gas authorities' manufacture of gas.

P. OGDEN LAWRENCE.

Lincoln's Inn, March 30, 1914.

NOTES FROM ABROAD.

Gas Supply in Rome Last Year.

The working of the Anglo-Romano Gas Company in the past year resulted in a net profit of 3,377,074 lire (about £135,083), out of which a dividend of 50 lire (£2) per share has been paid. While the quantity of gas supplied to the public lamps tends to decrease, the reduction in the charge for electricity induces many private consumers to employ it in place of the older illuminant. The Directors have consequently endeavoured to the utmost of their power to encourage the use of gas for heating, cooking, and industrial operations. Their efforts have been very successful; and they hope that in the near future the consumption of gas for these purposes will compensate largely for the falling-off in the quantity used for lighting. On the whole, considering the dearness of coal, the Directors think the results of last year's working may be regarded as satisfactory; while those for the current year, so far as it has gone, justify the hope that they will be still better.

The Honest Gas Consumer Again.

The Omaha Gas Company has recently discovered between fifty and sixty gas consumers in its area who cannot be called customers for the simple reason that they dispense entirely with the services of a meter, and so obtain their gas free of charge.

Canadian Coke-Ovens.

The figures issued for 1913 by the Canadian Department of Mines show a coke production from coke-ovens of 1,517,133 tons, as against 1,406,028 tons in 1912. Over 68,000 tons of coke were exported last year, and nearly 724,000 tons imported. There were also produced 10,608 tons of sulphate of ammonia, 8,371,600 gallons of tar, and 3353 million cubic feet of gas. When the report closed, there were 1720 ovens in operation, and 1325 ovens standing.

Curious Gas Increase Rates.

The report for 1913 of the Public Service Gas Company of New Jersey shows that the increase in gas sales for the year was 6·48 per cent., though the revenue from this source decreased by nearly $126,000, owing to a reduction in price imposed by the authorities. A curious fact is that for years past there has been an annual increase in gas sales of 7 per cent. or more, whereas in 1913, with the reduced price ruling most of the year, the increase was only 6·48 per cent.

Bad Municipal Control.

A sad story of municipal control is told by the gas undertaking of Eufala, a town in Alabama, which may have to close down in the near future—a profit of $69 in the last report being the only one it has shown. Its decline is said to date from the time, several years ago, when the city took it over; ever since then it has been run at a loss. It seems curious that the authorities should let the concern go down in this way, when, as is stated, a few thousand dollars would put the works on a sound basis.

German Sulphate of Ammonia in 1913.

The German Ammonia Sales Association recently issued a report on last year's sulphate market. This, it was found, was affected mainly by the poor consumption at the end of 1912, which had the effect of leaving large buyers with big stocks on hand at the beginning of the year. The Association placed 324,380 tons, as against 309,947 tons the previous year; but this increase of 14,433 tons in sales compares with an increased make of 57,180 tons. Some difficulty was also found in the export branch; there being a reduction in foreign sales of nearly 4700 tons—that is to 62,456 tons.

An Unpopular Gas Company.

A curious law suit is reported from Elmer, New Jersey. Some three years ago, shortly before a certain Brooks was elected as Mayor of Elmer, the New Jersey Gas Company cut off the supply of gas from his office, but failed to remove the meter at once. At the end of a year the Company asked for the meter, but Brooks refused to give it up till storage had been paid for the period during which it had been left on his premises, for which he claimed 10c. (5d.) per diem. The case came before a Jury, which found for the Mayor with damages, though assessing the daily rental at 7½c.—giving a total sum of $75 (over £15). This all seems very petty, but it appears that it is the result of an old feud in Elmer, dating back some years to an occasion when the gas was turned off and the town left in darkness for a week, until the city agreed to the Company's new terms for a street lighting contract.

New Gas Supply Conditions at Calais.

The Municipality of Calais have lately revised the conditions under which the concessionary Gas Company (the Compagnie Française d'Eclairage par le Gaz) will continue the service. The price of lighting gas will be reduced from 25c. to 16c., and of that used for motive power from 14c. to 12c., per cubic metre, according to the quantity consumed; these figures being equivalent to reductions from 5s. 7¾d. to 3s. 7¾d. and from 3s. 2½d. to 2s. 8¾d. per 1000 cubic feet. The town will benefit by an allowance of 10 per cent. on the gas used for public lighting, and of 1c. per cubic metre (2½d. per 1000 cubic feet) on that employed for industrial purposes. The gas for lighting the streets and municipal buildings will be charged at 9c. per cubic metre (about 2s. per 1000 cubic feet). The concession, which in the ordinary course would terminate six years hence, will be renewed for a period of thirty-seven years, so as end with that entered into for the supply of electricity. The whole of the plant will then become the property of the town. The new concession will come into force at the beginning of the month following its acceptance by the Prefect.

At the annual meeting of the Iron and Steel Institute last week, a sum of £100 was granted to Mr. A. Sander, of Karlsruhe, for the purpose of carrying out an investigation of the Feld process for the production of sulphate of ammonia in connection with coke-oven gases.

According to a communication that appeared recently in the "Monatsh Chem." [No. 34], Baron C. Auer von Welsbach has, by the fractionation of ytterbium, isolated and purified the compounds of two constituent elements—cassiopeium (Cp), atomic weight 175, and aldebaranium (Ad) atomic weight 173. From the original 500 grammes of ytterbium oxide there were obtained about 48 grammes of cassiopeium oxide, and upwards of 200 grammes of aldebaranium oxide.

A high-level railway platform is being erected on the Coignet system of reinforced concrete at the Tradeston Gas-Works of the Glasgow Corporation. It has a total length of 362 feet, a width of 28 feet, and a height of 20 feet from the ground level to the top of the rails; and it is for the purpose of enabling coal-trucks to be emptied into the store. The platform has been arranged to carry two standard gauge lines, and openings have been provided between the rails to facilitate the dumping of the coal. A locomotive crane will also be provided for the purpose of loading the trucks from the coal-store by means of a grab. The advantage claimed for the Coignet system of construction is that there are no loose bars; ample provision being made for keeping them in their proper position during the concreting. The work is being carried on under the supervision of Mr. Alexander Wilson, the Engineer and General Manager of the Corporation Gas-Works and of Mr. Harrison, the Chief Assistant Engineer.

ELECTRICITY SUPPLY MEMORANDA.

THE spasmodic advocacy of schemes for the lighting by electricity of small houses and cottages serves from time to time to show students of the electricity supply industry that it has its limitations, both financial and physical.

From Fiction to Facts. The line of business under consideration has lately had a fresh airing—the one case serving to show how the ultra-enthusiastic engineer can see nothing but good in such a scheme, while the hard-headed commercial men who are supposed to control the movements of their engineer can see substantial losses on what is being done. We have lately had an opportunity of investigating the supply of electricity to some small property in a certain gas-supply area. The electric lighting of these houses, such as it is, has been in use now for some time; and the switches and other fitments are falling into a bad state of repair. The electricity suppliers are the local authority; and, when these small houses were built, they were wired by arrangement with the builder (to the exclusion of gas-pipes) to half-a-dozen points for lighting. Investigation in some of the houses shows that in three of the rooms 32 candle power metallic filament lamps are installed, and in the entrance passage, the scullery, and one bedroom 8-candle lamps are employed. In several cases the age of the latter is to-day a little doubtful, as the lamps are of the carbon filament type, and dirty. The tenants of these small houses do not like the lump expense of electric-lamps; and they would much prefer to pay an occasional 2½d. or 3d. for a gas mantle than (say) 2s. 9d. or 3s. for a metallic filament lamp. Most of the tenants of the houses seem to make general use of the "back room" or the kitchen; and of the "front room" for a few hours only on Sundays. In the bedrooms of some of the houses candles or oil-lamps are used —even in the one in which the wretched 8-candle power electric lamp is fixed. Since the houses were built, most of them have had to have the floor-boards through the passages up again, in order to run in a supply-pipe for a gas-stove, as the builder and owner find that a gas-cooker is a *sine quâ non* to tenancy. Gas having been put into the houses, several of the tenants have had a bracket and incandescent burner fixed in their kitchens, where the family when alone spend much of their time. What is the result of this poor use of electricity in several of the houses? The largest bill ever paid for current is not more than from 4s. to 5s. per quarter; the average per quarter being much less than this. The electrical engineer in the district should read a paper on the cheapness of electric lighting for the working man, and take these houses as an illustration, giving a faithful representation of the extent of the use of the light. With the low revenue derived from these houses which the local authority wired in order to keep out gas supply, and in each of which they have installed a meter, they must be, calculating all outgoings, losing money annually. One result is seen in the fact that, in another part of the district where similar houses have been erected, the local authority have not made any move to wire them.

Supplemental Consumption Wanted. The working-class population in the district is a considerable one, and the gas consumers on the prepayment system are counted in "golden numbers." The consumption of gas is generally speaking from 10,000 to 12,000 cubic feet per annum; the people —men and women—being largely employed in factories, living much the same life. There are stragglers above the figures named, and stragglers below; but consumption includes lighting and the use of a cooker, and the price per 1000 cubic feet, embracing all charges to the prepayment consumers, is in proximity to 3s. It is easy to calculate fairly closely what these consumers (who are not large light users) pay a year for their gas and the conveniences afforded them. But owing to the economy of incandescent burners (which the people adopt through becoming accustomed to them in the factories), there is little gain to the gas supplier from economical prepayment users of gas for lighting only, any more than there is to the local authority who experimented in lighting the small houses with electricity. The use of gas or electricity for other purposes in such houses is almost a necessity, in order to make a paying branch of the prepayment business. In the case of gas, this is quite possible, owing to low capital cost and working efficiency compared with anything electricians can put in the way of these small-house customers. Where is the electric-cooker, of moderate initial cost, that can do bulk cooking for the whole family on Sunday, and descend in the week to quickly cooking father a herring and making him a cup of tea or coffee in the morning, that can boil water for domestic requirements, and heat up the water in a big vessel for giving the children a warm bath on Saturday night, without having to wait long for it? Where there is only one pair of hands to do a lot of housework and attend to the family, there is not time (let alone money) to be wasted over leisurely electrical heating and finical methods of cookery operation. The factor of safety, too, has to be very big in such houses; as tender mercy for cooking appliances is not usually a marked trait of people engaged in factories. The electricity industry has much to do before it can make revenue from the working man's home show a profit on the expenditure that must be incurred to render facilities equal to gas. If anything, the metallic filament lamp has made more difficult the task of getting a paying revenue from small houses. It is at times useful to make personal investigation into these matters, in order to test the florid advocacy of those ultra-enthusiasts in the electrical world to whom reference has been previously made.

Imposture or What? Having given its newest lamp the deceptive appellation of "half-watt," the electrical industry is not inclined to renounce it, though there are investigators of the lamp that have yet to find one that affords an efficiency as high as 1 candle per half watt. Per candle, the current used is more than this; though the efficiency is an advance on previous metallic filament lamps. The nominal candle power of the lamps has also been conceived in error, and is not ratified by actual photometrical test. There is less talk now about small units of the half-watt class. What with having to shield the high power lamps on account of their excessive intrinsic brilliancy, the lamps not altogether reaching the efficiency ascribed to them, and the electricity industry finding that the expenditure incurred on many of their lighting consumers is not luxuriantly compensated by the use of the metallic filament lamp, there is not much encouragement to electrical men getting excited over the new lamp. Not long since we showed how the "Electrical Times" (which has been praying for low unit half-watt lamps in order to put additional energy into the sleepy-headed part of the constituents of the electricity supply industry) was "sold" over a purchase of small unit lamps which purported to be of the half-watt order, and were not [see "Memoranda" for April 7 last]. It is more careful now in conferring its applause upon "half-watt" profession rather than actual tested performance. A circular has reached our contemporary describing "Ferrowatt" half-watt lamps. We are surprised the "Electrical Times," without photometrical tests, should have had sufficient confidence even to place at the top of the paragraph referring to this circular, "Low Candle-Power Half-Watts," because there is nothing about the circular to guarantee it against further deception. Lamps of 100-candle power are said to be rated at 50 watts; but they are only for 10 to 25 volt circuits, and 100-watt lamps are for 20 to 65 volt circuits. From which, unless a transformer is employed, it is seen that to enable the use of these small unit lamps on ordinary circuits, they would have to be run in series. But we do wish that our electrical friends would not describe lamps as "half-watt" or "watt" ones that in performance cannot live-up to the names arbitrarily bestowed upon them.

Water Heating. This is the season when it is a good thing to talk of water-heaters. The gas industry has lately been talking very much of those of the gas-heated type; and it has been shown that some excellent efficiencies have been realized from them. The electricity industry is always vainly endeavouring to get on a level with the gas-heating business with expensive, complicated, and easily deranged appliances, and with 3420 B.Th.U. per unit of electricity. The attempts at producing something to compete with gas in this respect are as ludicrous as the fatal attempt of the frog to inflate itself to the size of a certain animal of the bovine order. A new "Plexsim" electric water-heater is put forward as something that can give a "continuous" supply of hot water for domestic purposes and in public lavatories, and another merit is that it can be made in any shape or size. The principle on which the appliance is designed is that of providing for heat storage. In the case of 10 to 15 gallon tanks, the heating element is loaded to 300 watts. The reports admit that the water is "slowly" raised in temperature, and that, starting from cold, it will take a considerable number of hours to get the water to a temperature of 150° or 180° Fahr.; but it is declared that heavy lagging prevents much loss of heat. There must be continuous loss; there is not anything like 100 per cent. efficiency to be obtained with a slow-heating arrangement of this kind. We calculate that, with losses, we shall not be doing any injustice to the heater if we say that, with a loading of 300 watts per hour, it would take something like twenty hours—perhaps twenty-four—to raise the temperature of 10 gallons of water from (say) 48° to 180° Fahr. As to the "continuous" supply, if 10 gallons are drawn off for the purpose of having a sponge-down, the heater has to start afresh, and there is then another weary wait. This is not "continuous" water-heating as known in the gas industry; and when we can talk of 2 gallons of hot water per minute being obtained from simple contrivances—well we can afford to be generous, and not laugh too loudly at the attempts to fit electricity to the job of water-heating.

Plaster and Disaster. There has been quite a long silence on the part of those who preach the gospel of cheaper wiring, with the view to an extension of business in houses that cannot afford the best of everything. The fiery and other troublesome incidents in buildings where even good systems of wiring have found place urge the raising of standards rather than the lowering of them. There has been a case going on in the Law Courts that has brought trouble on quite a number of people. The War Office for their Medical Staff College and Laboratory at Millbank wanted the best of electric lighting installations; and they think they did not at first get what they desired. It was not a question of expense with them—the taxpayers pay. It was not a question

of expense on the part of the Consulting Electrical Engineers (Messrs. Kirkland and Capper), because they were to be paid 5 per cent. commission on the cost of the work, of which commission it seems that the Architect for the building (Mr. Woodd), by mutual arrangement, was to have 1 per cent. But Messrs. Kirkland and Capper decided that, for the building, lead-covered wire would be the best or most convenient, despite the fact, that it was stipulated in the specification that lead-covered wires should only be used in cases where the wires passed through cornices, mouldings, or walls. There was trouble afterwards; and it appears that the War Office have since had the wiring pulled out, and the building rewired—the wires being now run in tubes. The action which occupied various sittings in Mr. Justice Lawrence's Court was brought by the War Office against the Consulting Electrical Engineers and the Architect to recover damages for negligence. Beyond the use of lead-covered wiring, it was complained that the wires were hidden away in the plaster-work without proper protection. To sum up, the installation was asserted to be most unsatisfactory, and to be an utter failure. Among the annoyances to which the War Office appear to have been subjected was the plunging of the whole building into darkness at an important function soon after the opening of the establishment.

Points as to Lead-Covered Wires.

Mr. Allan Kirk, the Electrical Engineer to the War Office, it is gathered from the evidence, does not like lead-covered wire because it invariably breaks-down owing to the covering being damaged by kinking and abrasion; and if nails are driven into the wires through the plaster, the system becomes dangerous. In one case where the outer cover had been torn against the sharp edge of the brickwork, the rubber insulation broke down, and the wires fused. Mr. W. H. Patchell also considers it a dangerous thing to run lead-covered wires in plaster. It was stated at one part of the hearing that the Consulting Electrical Engineers seemed to suggest that the Architect "made them do what they did." Regarding the lead-covered wire, it was contended on their behalf that what happened was due to interference with the installation by men of the Royal Engineers. It was also pointed out that many large establishments have had lead-covered wire installed—Guy's Hospital, for example, where some 30 miles of this type of wiring is used. Another contention was that for two or three years there was not proper supervision over the installation, which indicates expert opinion as to the tender care that should be bestowed on an electric lighting system. Cost is not summed up in expenses for electric current and lamps, but must include consideration of the installation, expenses for attendance, and inspection. Quite a number of electrical men appeared in the witness-box in defence of Messrs. Kirkland and Capper. There are points in a case of very great interest, as it involves the question of the liability of consulting engineers in connection with work entrusted to them, and the question of the propriety of using lead-covered wire in places where it is liable to damage, or in places where it will be concealed from sight.

The Responsibility of Consulting Engineers.

The result of the case is not one that will please Messrs. Kirkland and Capper, or Mr. Woodd, who must have been uncomfortable while Mr. Justice Lawrence was speaking his mind regarding the 1 per cent. commission that the latter received from the Consulting Electrical Engineers. His Lordship is of opinion that the adoption of the lead-covered wire system was undesirable in itself, and improper under the specification. It was the adoption of this form of wire buried in plaster which was one of the contributory causes of the defects which subsequently revealed themselves. It was also considered true by his Lordship that the supervision of the wiring work was negligent or inefficient. He found, too, that under his contract Mr. Woodd was to be responsible (*inter alia*) for the lighting, and for its proper supervision and execution; and Mr. Woodd required the system of wiring adopted to be put in, although contrary to the specification. Then came the point as to commission:

> Furthermore, he shared in the payment made by plaintiff for that very work of supervision. It was a matter of regret to him (Mr. Justice Lawrence) to have heard, and to have to express his disapprobation, of that secret commission transaction between defendants. The excuses put forward for it were most unsatisfactory. There was no service performed by Mr. Woodd for Kirkland and Capper proved before him which he was not bound to perform under his obligations to plaintiff. The hollowness of that excuse was further demonstrated when it was shown that he had charged plaintiffs under clause 14 as for "special interviews or plans" for the very attendances which he had made upon Kirkland and Capper. Lastly, the argument that his commission of 5 per cent. was not to be calculated upon the cost of the electric light installation did not, in his (Mr. Justice Lawrence's) judgment, have the effect of making his services in the matter of the electric light unpaid services. The duties he undertook by his contract were expressly provided for, the particular items upon which he was to have commission was only the mode of calculating his remuneration; it had no effect whatever in either expanding or limiting the duties he expressly undertook.

For these reasons, his Lordship thought all defendants were liable to plaintiffs in damages. As to damages, he limited these to the cost of reinstating in an approved method the circuits which were found to have failed upon the joint test in January, 1910. Judgment was therefore entered for the amount agreed or found against both sets of defendants, and with costs. The damages and costs will not be a negligible quantity, nor will the memories of the case for the chief actors.

ILLUMINATION AT THE PANAMA EXHIBITION.

Novel Effects with Gas and Steam.

In the "Journal" for the 31st ult. (p. 890), we gave some particulars, from an article by Mr. H. F. N. de Bille, of the novel illumination scheme which will be carried out at the Panama-Pacific Exhibition to be held in San Francisco next year. The writer has published some additional information, which we give below.

It has long been realized that the finest lighting effects are produced on the stage, where the source of the light rays is always hidden. Bearing this in mind, the engineers have treated the exhibition as if it were in reality a huge stage, with the palaces, trees, and shrubs mere bit of painted scenery upon the boards. Every art of stagecraft has been utilized; and in the majority of instances many original improvements have been added. At former exhibitions, it has been the custom to outline the principal architectural features by incandescent lamps. While many beautiful effects were derived from the use of this system, it was readily seen that the high lights and shadows were eliminated by it, and, as a natural result, the perspective was lost—leaving only a flat and unattractive surface without relief. In the present case the plan decided upon is to flood the façades of the buildings with an intense white light, and to accentuate the natural shadows by the use of purplish dipped lamps which are concealed. In this way the architectural features are strongly emphasized, and yet the relief effect is not destroyed. Huge standards of ornamental type, from 10 to 30 feet in height, and each bearing one to thirty lamps, will be placed on the side of the walks nearest the palaces. Only the side facing the buildings will be left uncovered. The other faces will be shielded by large metal banners artistically moulded and decorated. In order to obtain the pure white light necessary, a special type of lamp, not yet upon the market, has been devised, and the result is a production of a dead-cold beam which will flood the buildings with the rays.

As an aid to the general scheme of illumination, hundreds of thousands of jewels will be used. They are moulded in Austria, of a specially hard glass, and are afterwards farmed-out to the peasantry to be hand-cut and polished. Each is nearly 2 inches in diameter, and is an imitation of a well-known cut of diamond. They are suspended from tiny metal clasps in such a manner that even with only the natural vibration of the buildings they will sway and quiver, scintillating under the rays of light. In each of the courts a number of search-light projectors will be placed, and will play upon the jewels, creating an indescribable effect.

A climatic peculiarity of San Francisco is being utilized in connection with the "Scintillator," to which reference was made by Mr. De Bille in his article already alluded to. Every night, with the sinking of the sun, great fog-banks roll in, and hang 200 or 300 feet above the bay and city. As they pass through the Golden Gate they will be met, and their presence heralded, by the scintillator—a battery of forty-eight 36-inch search-light projectors fitted with screens of every colour in the spectrum. Their beams, of two billion candle power, will follow the fog banks from their first appearance until they hang in their usual nightly position, and will then play upon them what is described as a "harmonic symphony of light."

The credit for the marvellous effects which will be displayed by the illuminating devices at the exhibition is due to the multiplicity of inventions which have been recorded during the last decade, all of which, Mr. De Bille says, will be utilized to make the site "a veritable fairyland of light and beauty."

"Practical Illumination."—Under this title, Mr. Justus Eck, M.I.E.E., has published, through Messrs. S. Rentell and Co, Limited, of Maiden Lane, Strand, W.C., a pocket-book for engineers, contractors, and all interested in efficient illumination by electricity. The author states in his preface that his object is not to displace any of the existing publications on the subject, but, by putting the matter on a simple, practical plane, to encourage the more extended study of the subject of illumination. The price of the book is 1s. net.

Manchester District Institution of Gas Engineers.—The Institution will meet in Manchester on the 23rd inst., and, on assembling at Market Street, will leave by special car for the Rochdale Road Gas-Works, where they will inspect the 4 million cubic feet per day Glover-West installation of vertical retorts now nearing completion, and also the various retort charging and discharging machines in operation at these works. For the occasion of the visit, the President (Mr. J. G. Newbigging) is preparing a description of the works. The Gas Committee will afterwards entertain the members at luncheon in the Town Hall, at which function the Lord Mayor hopes to be present. The business meeting (which will also take place in the Town Hall) will include a paper by Mr. W. M. Carr, of Ormskirk, on "The Application of Stoking Machinery in Small Gas-Works."

WORKS TOPICS.

By "Modus Operandi."

Improvement in Ammonia Yield.

In an article on the "Recovery of Cyanogen Compounds as Ammonia ["Journal," May 5, p. 326] the writer states that the "material advance made in connection with ammonia recovery during the last decade may be said to be almost entirely due to precautions now taken in the collecting and storage of gas liquor." While the exercise of care in collecting and storing liquor does have an excellent effect on the ammonia returns, I would suggest that a still more important factor is the change wrought by carbonization in heavy charges. With the six-hour charge, the ammonia had perforce to run the gauntlet of the considerable amount of radiated surface at the top and sides of the retort. On the other hand, with the heavy charge a very large proportion of this radiated surface is covered by the charge, which, at the time when the major portion of the ammonia is being evolved, is not sufficiently hot to split up the ammonia already formed. The net result, therefore, is that the rapidity with which the gas and ammonia pass from the retort during the stage when the conditions are favourable for the production of NH_3 has been greatly increased, and the area of the destructive radiating surface of the retort has been greatly decreased. The combination of these two influences has been, I maintain, a potent factor in favour of a higher yield of ammonia, much more so, in fact, than that mentioned by your contributor. Far be it from me to belittle the necessity of preventing the leakage of ammonia; I am only anxious to draw attention to an advantage of the heavy charge, which appears to be overlooked in the article in question.

In the same paragraph some surprise is expressed that recent improvement in ammonia yields has been obtained, in spite of the higher temperatures of carbonization. In this connection, it must not be overlooked that it is not the temperature of the retort, but the temperature of the charge which determines whether or not the conditions be favourable for the production and preservation of the ammonia. The coal in a retort, especially when it is filled, has a very similar effect on the retort as does water on a kettle. As a consequence, the temperature in a filled retort, through which the ammonia is passing, must for many hours be maintained well below the figure at which NH_3 will split up into nitrogen and hydrogen.

Having had the experience of changing from a six-hour to a twelve-hour system of charges, and having witnessed the very considerable and immediate increase in the yield of ammonia, I have reason to believe that the heavy charge is a more important factor than the prevention of leakage. Subsequent to this change, a campaign on uncovered seal-pots, and at other points where ammonia was escaping, was disappointing in its result; being quite small as compared with the improvement from the previous alteration in the system of working.

The article in question is exceedingly interesting, dealing as it does with a practical method of extracting the cyanogen without, however, swamping the market with a product which is in but limited demand.

Calorific Power Standard.

Most gas engineers will be glad to see the last of the testing for illuminating power, but few will view with favour the decision given in the case of the Gas Light and Coke Company. Many will have reason to be disappointed that the penalty limit has been fixed at a figure which will be more difficult to exceed on a one day's test result than is the case with a 14-candle power (No. 2 "Metropolitan") standard on the basis of a three days' average. The practical works manager, who has to work to these standards, will, I imagine, be far from pleased with the change, which to him will mean extra anxiety, and probably a reduction in yield of gas per ton. A one day's test in practice increases enormously the danger of being penalized. As a consequence, a higher margin will have to be allowed, with the obvious result that the make will drop. The three days' average was a reasonable concession that one might expect to be granted by authorities who realized, firstly, the difficulty of maintaining uniformity in quality, and, secondly, the reputation enjoyed by gas companies for satisfying their consumers, apart altogether from restrictions, which in these days of severe competition are as unnecessary as parliamentary regulation of the profit to be charged by Harrods or Selfridges for frocks and frills.

Unless I am quite wrong, compliance with the new standard will necessitate an increase in the quality of the gas, with, eventually, inevitable loss to consumers in the matter of price. Assuming that gas of 530 B.Th.U. gross has been sufficiently high to maintain without risk the 14-candle standard on the three days' average, it is quite certain that it will be insufficient by at least 20 or 30 B.Th.U. to maintain *without risk* a calorific power of over 500 B.Th.U. on the one day's test. The crux of the whole matter is the abolition of the three days' average, and the consequent necessity of allowing a much greater margin for contingencies.

A Simple Type of Elevator.

It is often necessary to construct elevators for handling coal, coke, breeze, or oxide in gas-works; and as it is always desirable to cheapen the initial outlay and up-keep on such plant, it may interest readers to learn that a very efficient and simple form of elevator may be made out of old crane chain. Having had an elevator of this kind in use for some time, I have been impressed with its distinct utility, especially in cases where the wear and tear is excessive, and where, as a consequence, an ordinary elevator chain would last but a short time. For the elevating of so destructive a material as pan breeze, the use of old crane chain, having only scrap value when discarded as unsafe for lifting purposes, can be recommended in the interests of economy. Most engineers will at some time or another have been struck with the uselessness of old lifting chains, which for reasons of safety have to be condemned while still in comparatively good condition. Any good use for such material must, therefore, be worthy of consideration.

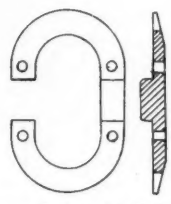


Fig. 1.—Detail of Split Link.

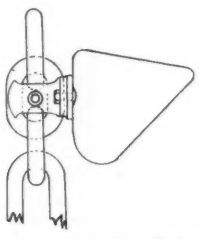


Fig. 2.—Side Elevation of Attachment.

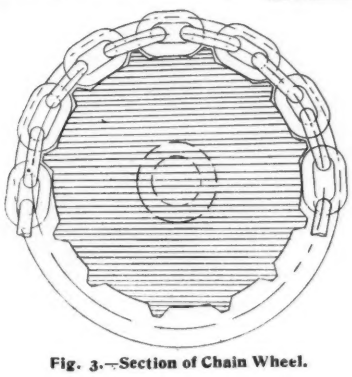


Fig. 3.—Section of Chain Wheel.

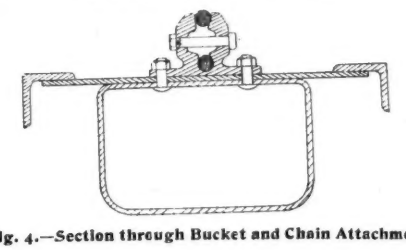


Fig. 4.—Section through Bucket and Chain Attachment.

From the sketch here shown, it will be noticed that essential features of such an elevator are special clips for attaching the buckets to the chain, and special sprocket wheels cast to suit the size of chain which it is proposed to use. The wheels should be designed to suit the old chain when discarded, as in this state it has worn and stretched, with the result that the pitch has been altered. As a matter of fact, it has been found in practice that as the chain continues to wear the pitch naturally increases; but this has no adverse effect on the working of the elevator, which, I may say, is contrary to expectations. Even if the chain due to wear mounts the sprocket-wheel out of gear, it is found to be of no consequence in actual working. This frequently happens, but with no ill-effects. In fact, this type of elevator has been a decided success; and it is anticipated that the old crane chain, which was taken off the scrap heap, will elevate from 5000 to 10,000 tons of rough material before again returning whence it came. It should be explained that the ends of the chain are connected at one point by a split link, forged as shown in fig. 1, and riveted in position.

Next week I hope, in response to Mr. R. S. Ramsden's query ["Journal," April 28, p. 268], to refer again to the drying floor used in the breeze-washing process, to which allusion was made in this column on April 14.

Tar for the Basic Linings of Steel Furnaces.—This subject has been recently dealt with by Herr J. Wagner in the "Revue Métallurgique" [No. 11]. According to an abstract of his article in the "Journal of the Society of Chemical Industry," the constituents of coal tar which are beneficial in preparing furnace hearths of dolomite and tar are coal-tar acids, anthracene oils, and non-volatile pitch. The prejudicial constituents are light oils, naphthalene, free carbon in too high a proportion, and coal-tar bases. Tar intended for the purpose named should yield on fractionation not more than 8 per cent. below 230° C., and not less than 30 per cent. between 230° and 350° C.; and the loss on distillation should be about 3 per cent.

MAKING BRANCH CONNECTIONS UNDER PRESSURE IN OSAKA.

By K. Shimomura, the Chief Engineer to the Osaka Gas Company, Limited.

Mr. J. Ferguson Bell, M.Inst.C.E., of Derby, in forwarding the following communication by Mr. Shimomura, makes some interesting remarks with regard to the progress of the gas industry in Japan. He says: "The enclosed description of a method adopted in the making of 24-inch branch connections, under pressure, along with photographs, sent to me by Mr. Kotaro Shimomura, will, I think, interest your readers—especially coming from the cultured Chief Engineer of the Osaka Gas Company, Limited, of Japan. Mr. Shimomura has not only spent much time in the pursuit of Western knowledge, but is a keen observer of Western methods and practice; and I venture to hope he will from time to time give us of his experience. It indicates the rapid progress of the gas industry in Japan. Its inherent strength and vitality signify the triumph of new ideas, accomplished by untiring efforts and activity in the building-up of a public utility service, that will tend towards further advancement and prosperity of that marvellous country which, during the present generation, has made such amazing progress in what counts for greatness in the life of a nation. It is well known that in the Far East various branches of Western methods of practice are being rapidly adopted, and in none to a greater extent than in the gas industry—especially in Japan, which takes a foremost rank among progressive States, and owes much to zealous and highly trained disciples of Western thought and ideals, among whom may be numbered the officials of the Osaka Gas Company."

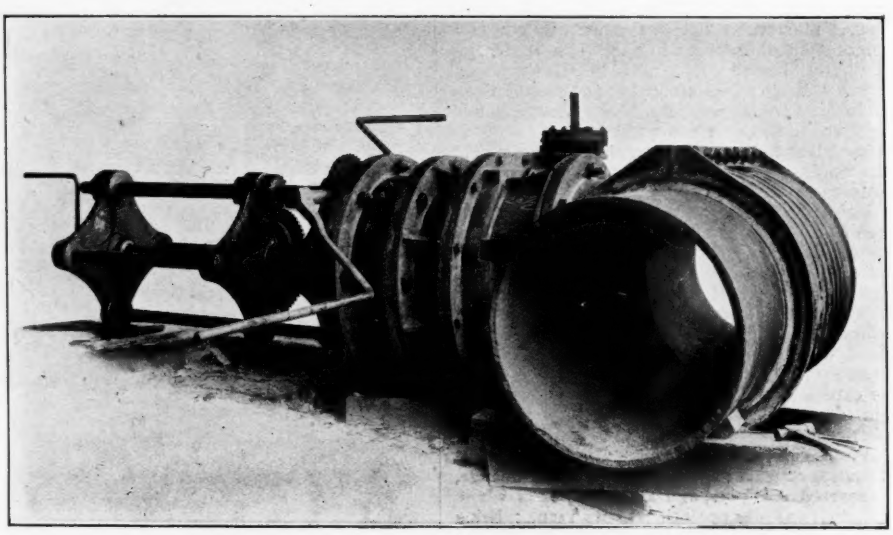


Fig. 1.

In connection with the operations of the Osaka Gas Company, it became necessary to make two 24-inch branch connections to the trunk main of the same size, which could not be shut off under any circumstances. To carry out this work with safety, and without disturbing the distribution of gas, the use of the Ruscoe machine was suggested. Having been assured by Mr. J. Ferguson Bell, of Derby, that the method was entirely reliable and safe, we obtained an outfit, consisting of a machine, two sleeves, and two valves. With regard to practice of this method, apart from a description given in the makers' catalogue, and that which appeared in the "Journal of Gas Lighting" for May 13, 1913, giving an account of work put through by the makers, we are aware of no other report appearing in print. Therefore, hoping that our experience may be of interest to readers, we venture to give an account of the work done in Osaka.

When the machine arrived, we set about to train our men in its use. As shown in figs. 1 and 2, a short piece of 24-inch pipe was drilled. These views illustrate what a clean cut is made into the side of a pipe.

Subsequently, we made the connections as planned, proceeding as follows: The main was, from the ground level, 6 feet deep to its centre; and around the portion of the main where the connection was to be made a pit 15 ft. by 14 ft. was dug out, and carefully boarded-up—this constituting the first day's work.

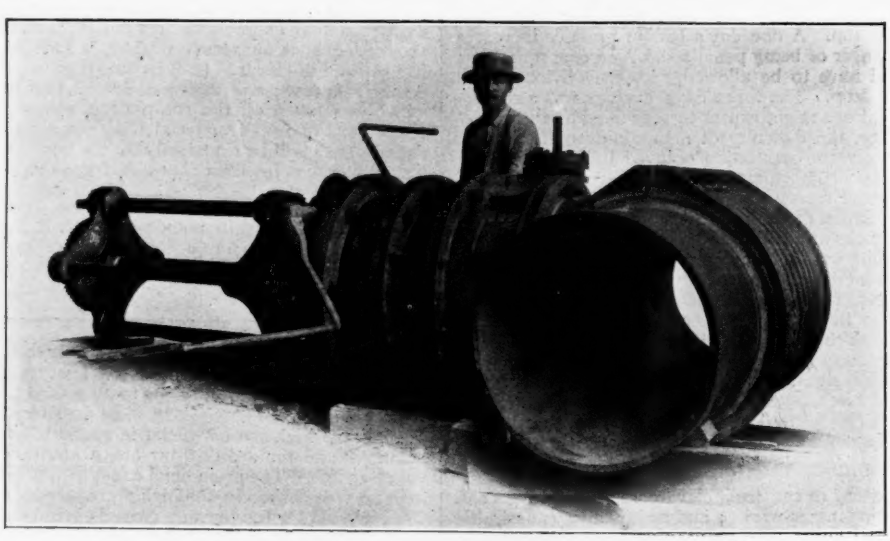


Fig. 2.

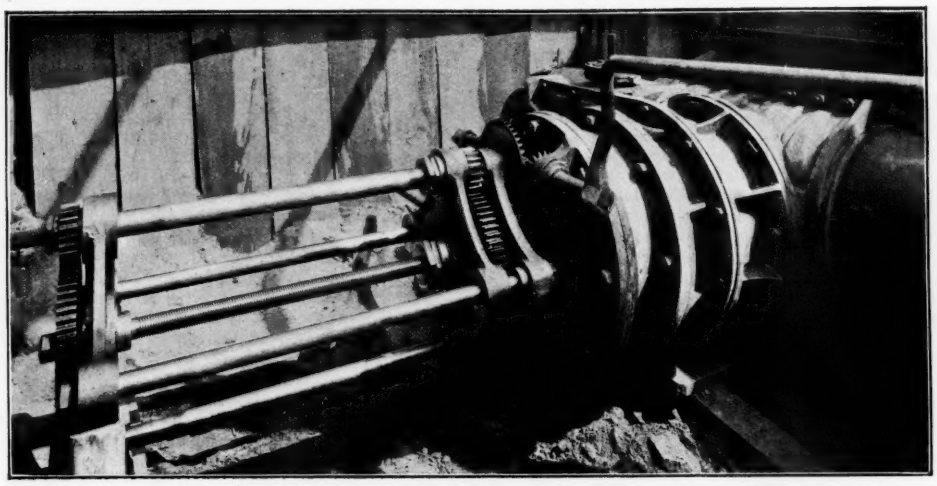


Fig. 3.

On the second day, a shear-leg arrangement was erected over the pit for lowering the sleeves, valves, and machine. Then the surface of the main on which the cutting was to take place was thoroughly cleaned of dirt, rust, and casting scales, by chipping over with a chisel. This was done so as not to dull the cutter teeth unnecessarily. After this, the split sleeve was bolted on; sheet-lead packing being inserted.

On the third day, the lead packing of the sleeve was caulked over the main; and the valve and a blank flange were bolted on, packed with asbestos boards. The whole was tested under air pressure of 12 lbs.; and after several small leaks were stopped, the blank flange was taken off and the drilling machine put in position.

On the fourth day, the drilling operation was started at 7.20 a.m., and was completed at 11.25 a.m.; the cutter having passed meanwhile 9⅛ inches. After the cutting operation was finished, the tool was withdrawn to the front of the valve, as shown in fig. 3, and the valve was closed. Having ascertained the tightness of the valve by taking out the plug of the test-hole, which had been drilled previously on the side of the short flange-piece shown in the illustration, placed between the valve-case and the machine-flange, the machine was taken off, as indicated in fig. 4. Fig. 5 shows the disc cut out of the main.

During the operation of drilling, six men were employed to turn the cranks; and the entire work, from the digging of the pit to the making of the connection, cost us £7. No leakage of gas occurred from between the drill-spindle and its boss, though the joint is a loose sliding fit, and there is no stuffing-box or packing. This immunity was evidently on account of a film of oil existing in the space between. The second operation of making another similar connection was carried out with equal smoothness.

The outfit as supplied by the makers may have been quite sufficient; but there was no centre-drill furnished, though the spindle is so made as to receive such a drill. And, moreover, the sleeves were not planed at the flanges. Perhaps these points were unintentionally overlooked by the makers. At any rate, to assure ourselves against any hitch in the work, we provided the machine with a centre-drill; for without it the disc cut out of the side of the main might fall out from the cutter and be left inside the main. We also planed the inside of the sleeve flanges; for if they were left rough and irregular the sheet-lead packing could not be held equally tight all over. In addition to the above, we found it convenient to provide a test-plug in front of the valve, with which to ascertain the tightness of the valve before taking off the machine.

Altogether the work was put through with such ease and safety that if there are many such connections to be made, even on mains as small as 12 inches, and if the type of sleeves be used which are made for inserting gas-bags with which valves would not be necessary, this plan may be found under certain conditions as safe and as economical as the usual methods, for in the ordinary way of cutting out and inserting a T-piece bag-holes must be provided on both sides of the cut, and a certain length of the pipe cut out must be reduced to scrap.

Fig. 4.

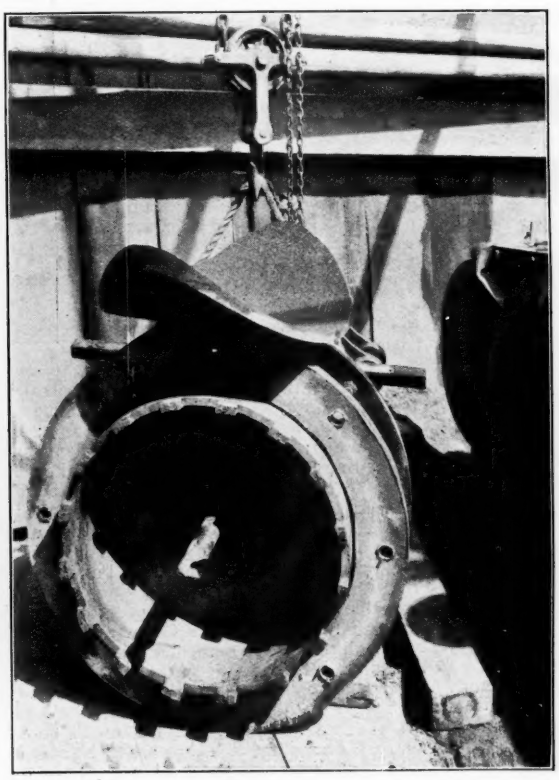


Fig. 5.

BIRMINGHAM GAS DEPARTMENT AT BINGLEY HALL.

As surely as spring arrives each year, so does the National Trades Exhibition in Bingley Hall, Birmingham. It is a great event locally; and it is largely patronized, both by people living in the city and in the surrounding towns. There is ample opportunity for them to pay more than one visit, inasmuch as the exhibition remains open for over two months. "National trades" is a fairly wide title; and this latitude is justified by the nature of the display. Entertainment plays an important part—as it must do, if the public are to be attracted in any numbers over a lengthy period to an exhibition—but the "serious side" is invariably well worth study. One national trade which we always look to see represented at Bingley Hall Exhibition—and so far have not looked for it in vain—is that which relates to the supply of gas. The opportunity is an excellent one. The pleasure-seeker requires light and heat in his private house, and so does the searcher after knowledge, who, in addition, may have a works in which the use of gas for industrial purposes would be of the greatest possible advantage.

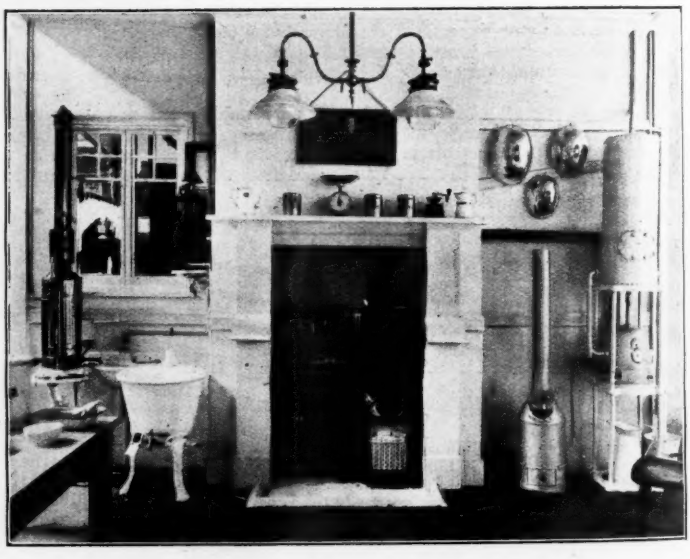
This view of the matter is the one which has for years past been acted upon by the Birmingham Corporation Gas Department, who have made it a practice to bring right to the front, by means of a stand at the exhibition, the commodity which they so freely dispense, on favourable terms, to the citizens. This "forward" policy, which one has so good a right to demand from Birmingham, pays well, of course; and those responsible for the administration of the gas undertaking are heaping increase upon increase. Only a week or two ago it was reported that the output for the last financial year exceeded that of the preceding twelve months by 8½ per cent.—80 per cent. one well-known newspaper stated, but this was an exaggeration!—and still further growth is now being confidently anticipated. This is really no more than the department's due; for those who study gas affairs in Birmingham will admit that they have deserved success. The Corporation gas display at the Bingley Hall Exhibition is an example of the efforts made to secure new business.

Apart from the stand itself, the lighting of the hall generally is an excellent advertisement for gas. The installation includes 73 1000-candle power Keith, Welsbach, and Breeden lamps; four 4500-candle Welsbach lamps; and 45 300-candle Breeden lamps. All these lamps are on the high-pressure system; and the whole of them are governed by two control cocks, and are lighted up by means of bye-passes. The gas supply is taken from the high-pressure main outside the building, and governed down to a suitable working pressure. The lighting round the facia of the stand is by means of 48 300-candle power high-pressure burners, fitted with pretty bead fringes.

As to this stand—which is in a prominent position near the main entrance—it must be said that the Corporation in their arrangement of it have hit upon an exceedingly attractive idea. In fact, they have made it quite a feature of the show. Adjacent to one another are two kitchens—one representing the period 1814, and the other 1914. The furnishings of the old kitchen are for the most part genuine antiques; and the crude cooking methods of the time are exemplified. There are to be seen the spit and smoke-jack, the log fire, and the stock-pot. Turn from this picture to the modern kitchen, every item of which emphasizes the cleanliness and convenience resulting from the use of gas apparatus. Here the cooking is carried out by means of a Wright combined gas-range; and there are also exhibited various types of gas water-heaters, a white-enamelled wash-boiler, gas-irons, a coffee roaster, a refuse destructor, and other domestic appliances—all of which nowadays seem so necessary that one wonders how they could ever have been done without. Most of the apparatus is connected up. Indeed, at intervals during the day a cook is in attendance in the modern kitchen, and demonstrates the making of small loaves and pastries in the cooker.

The two kitchens are separated by an arched gangway, in which are exhibited inverted lamps suitable for shop lighting; and on the walls there are shown photographs illustrating various installations of modern gas lighting, both high and low pressure. The value of suitable literature in the securing of new business is well understood in Birmingham; and on the stand an abundant supply is to be found—special price lists, pamphlets published by the British Commercial Gas Association, and booklets prepared by the Birmingham Gas Department staff. The popular picture post-card has also been pressed into service—an illustration in this form of the old and new kitchens being given away as a souvenir of what is in all respects a striking exhibit. The same method has also been adopted by the department of advertising the usefulness of cookers, wash-boilers, fires, &c.

There is another stand which is devoted to a branch of the gas industry the advertising of which is of great and ever-increasing importance. That is, coke. On one side of the stand there is shown an up-to-date coke-range, in which the usefulness of coke for domestic purposes is demonstrated; and on the opposite side is to be seen a drawing-room grate, showing (as an alternative to gas) how coke can be utilized to provide a cheerful fire, without the dust and ashes that are inseparable from coal. Those desirous of trying this fuel, can purchase at the stand penny samples of small coke in paper bags. It should be mentioned that the range is fitted with the usual hot-water circulating boiler and storage. Behind the drawing-room grate, too, there is fixed a Prior patent boiler, which will furnish a plentiful supply of hot water. It is said to be capable of warming four bedrooms and giving a supply of hot water for the bath.



As will be gathered from these notes, the Birmingham Gas Department well illustrate the use of gas for lighting, cooking, and heating. Its employment for power purposes is demonstrated by several firms of gas-engine makers, who have working exhibits of the latest types.

The list of Vice-Presidents of the Royal Institution for the current year includes the names of Mr. J. H. Balfour Browne, K.C., Mr. Charles Hawksley, Lord Moulton, and Mr. Alexander Siemens.

The annual meeting of the Illuminating Engineering Society will be held on Thursday of next week, the 21st inst. After the transaction of formal business, a paper will be presented by Mr. A. P. Trotter, on "The Nomenclature and Definitions of Photometric Quantities."

THE DIRECT PROCESS ON GAS-WORKS.

SOME OBSERVATIONS FOR THE INSTITUTION MEETING.

By "Amicus."

The writer has for a long time been specially interested in the proposals for the adoption of the direct-recovery process on gas-works, and is therefore pleased to note that at the forthcoming meeting of the Institution of Gas Engineers the subject is to receive attention through a paper by Mr. G. T. Purves, of Glasgow. Up to the present time, almost all that has been written on this topic has emanated from coke-oven people, who perhaps are not perfectly familiar with the circumstances and conditions of gas-works practice. It is to be hoped, therefore, that gas engineers will consider the question carefully, so that doubtful points concerning the suitability of the direct process for gas-works use can be settled once for all. Without in any way anticipating the subject-matter of Mr. Purves paper—and the writer believes that this gentleman has already had some experience of actual gas-works practice—it would be well to deal briefly with a few of the principal points to be considered in this connection. It is very desirable that at the Institution meeting the fullest criticism should be given by gas engineers, so that no possibility shall be overlooked.

The type of process which involves the least amount of variation from standard gas-works routine will naturally be the more attractive to a gas engineer; for we have to consider the adaptation of the process, not only to new works, but also to existing ones. How far will the new system fit in with the old plant? In the first instance, some modification of the ascension pipes and hydraulic main would be required. A dry main is a *sine quâ non* with the direct process; for one of the main objects is to produce as little ammoniacal liquor as possible. The arrangement required is, however, very simple. A valve is provided at the top of the ascension pipe, by means of which the retort is cut off from the gas collecting-main during the time the former is open to the atmosphere. This necessitates attention being paid to the valve every time the retort is opened. With a hydraulic main and consequent frequent flushing of the main, pitching-up is not a trouble that often arises. With the direct process, on the other hand, the temperature being kept as high as possible in order to prevent condensation, attention must be paid to the gas-main. The tar is liable to be distilled, leaving a deposit of pitch in the main which, if not removed, is liable to grow to uncomfortable dimensions. It is necessary, therefore, to take steps to ensure removal of the pitch; and ample provision must be made to allow of cleaning. It is customary, also, to flush the main occasionally with hot tar and liquor, and thus help to remove the pitch.

In many works a very long "foul" main is used, so as to relieve the condensers somewhat. With direct recovery this would, of course, be eliminated, as no condensation is wanted. It is suggested in some quarters that, on account of the fact that no cooling takes place with direct recovery, the whole of the light oils usually found in the tar will not be deposited, but will remain in the gas. If this is correct, the gas should have a very high candle power and calorific value, whereas actually the candle power and calorific value of coke-oven gas (from which the benzol has not been removed) are about the same as those for ordinary town gas. Data on this particular point are difficult to obtain—firstly, on account of the fact that at practically every installation where the direct recovery process is in operation benzol is also recovered; and, secondly, because no coke-oven plants have apparatus for determining illuminating power. Further, as pointed out above, with any direct-recovery process cooling of the gas would be necessary before purification, so that the light oil might then be found in the condensate. This theory, however, is not borne out in practice, so we have to conclude that the light oils are all removed with the tar.

It has to be borne in mind that there are two types of direct-recovery process—the high-temperature process, as operated by Otto, which is to be described by Mr. Purves, and the low-temperature process, as operated by Koppers, and described in the "Journal" in a recent description of the Budapest works. In the Otto process, there is no condensation at all, and no ammoniacal liquor is produced. Consequently there is no distillation of liquor, and no "devil" liquor to dispose of. In the Koppers process, there is a certain amount of condensation, and hence there is distillation of liquor and the production of some "devil" liquor. Both processes have been in operation for some time, and each possesses features which recommend it in varying circumstances. It will be seen that with the Otto process there must be no apparatus or mains in which condensation can take place; while in the Koppers process condensation is allowed. The process operated by Messrs. Simon Carvés, Limited, is a high-temperature process, and differs from the Otto process only in the type of apparatus employed for the removal of the tar. Each process has its own particular merits, both in principle and in the type of apparatus employed; and the plant to be adopted must depend on the circumstances of each individual case.

If there is no condensation, it follows that there will be no purification by means of the ammoniacal liquor, and consequently the whole of the CO_2 and H_2S contained in the gas will go forward, thereby necessitating more work on the part of the purifiers. Possibly the CO_2 will not be removed; but this must depend on the quality of the gas which is required to be supplied. In the case of those processes in which there is condensation, the liquor contains principally fixed ammonia salts, so that as far as purification is concerned there is little to choose between the two systems. In the hot process it will be seen that the whole of the ammonia salts, both free and fixed, remain in the gas; and it will be interesting to see what method Mr. Purves suggests to deal with these. On many coke-oven plants where this type of recovery process is in operation it is customary to allow a little liquor to condense, and then to wash the gas with it at a fairly high temperature. In this way, a solution of ammonium chloride is obtained which can be evaporated and a commercial salt produced. This course is generally only recommended in cases where the coal used gives much fixed ammonia on distillation.

With regard to the production of effluent liquor, in the high-temperature processes, the water remains in the gas in the form of vapour until after the extraction of the ammonia. On cooling, this water will be deposited, and will have to be dealt with. It contains, however, no lime salts, and is of a much less obnoxious character than the usual "devil" liquor. In the low-temperature processes, only the same amount of effluent liquor is produced as in the high-temperature processes; but as this contains the lime salts it has to be treated accordingly. In either case, the quantity produced is only such that its disposal should not be a matter of great difficulty on any gas-works.

The point which will perhaps arouse most interest among gas engineers is, What is the effect of the direct process on the quality of the gas made? Perhaps Mr. Purves will be able to give some definite information on this point, as a result of his own experience. It has frequently been asserted that the effect is *nil;* but it is apparently hard to convince gas engineers on this point. Chemically speaking, there should be no effect whatsoever on the composition of the gas, as the amount of acid present in the saturator is so small that it has no appreciable effect on the gas. Of course, as pointed out above, the direct process does not allow of the removal of some of the carbon dioxide by means of the ammoniacal liquor; and consequently on this account the illuminating power of the gas, and also its calorific value, will be affected. This effect, however, can only amount to about 1 or 2 per cent.; and this is within the limits of ordinary working variations. It will be interesting to know the CO_2 and H_2S contained in the same gas treated by the direct and the old methods, so that a comparison can be made, and also, if possible, the illuminating and calorific values of the gas under the same conditions. Definite information on these points is required; and Mr. Purves will render a great service to the industry if he can supply it.

With high-temperature carbonization, naphthalene troubles have increased; and any new system either of carbonization or of treatment of the gas has to be examined with regard to this question: How does the direct-recovery process affect the amount of naphthalene in the gas? The average gas engineer desires to remove the naphthalene as soon as possible, so that he has less area for possible trouble. With the high-temperature direct process, and no cooling of the gas, the naphthalene will be carried round until the purification process is reached. Consequently, there is a chance of deposition of naphthalene in any of the intermediate apparatus. With the low-temperature process, it is claimed that the naphthalene is removed by the cooling at the commencement of the process. On the other hand, in the high-temperature process the gas is well washed with tar; and this should have a good effect. In either case, the gas is cooled efficiently before purification, so that outside the works at any rate there should be no difference experienced.

Information concerning the number of men required and the cost of working the process, &c., will no doubt be forthcoming.

EVENT AND COMMENT.

[Communicated.]

It has been suggested to the writer that there is much room for the development of the scientific side of the gas industry among the smaller works in this country. On these small works there is no laboratory, and little, if any, provision for testing the coal, coke, gas, &c., periodically. Circumstances hardly warrant regular testing with its attendant expenses. There are, however, undoubtedly many instances where tests could be usefully made, such as a questionable consignment of coal, an inferior coke, gas, or tar, unsuitable purifying material, &c. The average small gas-works manager is generally inclined to let the matter in dispute drop rather than submit his case to an expert. He is afraid of the expert's fees, on the ground that the latter caters only for large works and charges accordingly. In Germany, the laboratory of the Gas Association supplies the need, and tests are carried out for subscribers at very moderate fees. Something of the sort could well be done in this country, catering especially for the smaller works. It could be done by a private individual; but if carried out by some influential body would be much more likely to succeed. The matter hardly comes within the scope of the British Commercial Gas Association as at present constituted. Perhaps the Institution of Gas Engineers could do something.

Surface Combustion.

Surface combustion has been very much before the public recently, but principally from an academic rather than a commer-

cial point of view. Indeed, one writer recently suggested that Professor Bone should indicate some points to which surface combustion might be put by a gas engineer. As a scientific proposition surface combustion is, of course, an accomplished fact, and experiments on a large scale have proved beyond all question the high efficiency of the system. Comparatively few boiler plants have, however, been erected; and it is always the practical results which convince possible customers of the real value of an article. Mention has been made of the plant at the Skinningrove Iron Company's works; and it has been shown that this plant is very successful. It is pointed out that the Bonecourt boiler has an efficiency of 80 to 90 per cent.—a considerable increase on the usual efficiency obtained on a boiler plant—and this indicates that considerable saving in fuel would follow the adoption of the system. It is interesting to note that Professor Bone considers that the boiler and steam turbine combination can now hold its own against the gas producer and internal combustion engine. Competition in such matters is very good in resulting as it does in a large amount of expert attention being devoted to the question of improvements. The writer is under the impression, however, that the capital cost of the new system is rather against its general adoption; the interest on the extra capital minimizing the advantage gained by saving in other directions. It would be particularly useful therefore if a statement could be published showing actual capital cost, maintenance, and working expenses in connection with such a plant.

Calorific Value Standard.

It is often said the chief qualification for a Government position is that the candidate shall know nothing about the duties of the post in question. At times one is inclined to think that this principle is really carried out in official circles generally, when one considers the attitude of certain official departments towards any change, even though the change is caused by the introduction of scientific improvements, and only involves the scrapping of obsolete standards. The writer has in mind, of course, the attempt which has been made in certain quarters to substitute a calorific value standard in place of an illuminating power standard for town gas. In all technical and scientific circles, the matter has been thoroughly thrashed out; and it is generally agreed by those competent to decide that the balance is a long way in favour of the adoption of the calorific standard. There is hardly a gas engineer in the country who would advocate the continuance of an illuminating power standard of 16 candles, although this is to be maintained in many instances. From arguments used at times against a calorific standard, one gets the impression that if the illuminating power standard were abolished and the calorific standard substituted, every gas engineer in the country would immediately cease to turn out a gas of any illuminating power at all, and would concentrate his efforts solely on the production of a gas to meet the calorific requirements. Although the relationship between the calorific value and illuminating power is not definitely determined, yet broadly speaking the two properties go together; and if a sufficiently reasonable calorific value standard is fixed upon, we can rest assured that the gas would not be totally devoid of illuminating power. On the Continent, of course, there is no illuminating power standard; but from observations made by the writer, the candle power at such places is frequently as high as from 12 to 14 candles by the "No. 2" burner. If such gas meets the requirements of Continental practice, it ought to meet the requirements of English practice equally as well.

Carbonization.

A lecture by Dr. W. B. Davidson always merits considerable attention by everyone interested in the development of gas engineering. Dr. Davidson is primarily a scientist; and he looks at things from a point of view quite different from that of the average gas engineer. After all, gas manufacture is a scientific operation, and, therefore, it is not asking too much to see that it is carried out in a thoroughly scientific manner. It is particularly interesting to note in the lecture given before the Scottish Junior Gas Association that Dr. Davidson advocated the inclusion of all sections in making comparisons between various systems of carbonization. Too often do we find that a particular system is chosen solely on account of the fact that it is a good system for gas production. In the writer's opinion, numerous items should be taken into account—such as capital cost, maintenance and repairs, depreciation, labour costs, yields of gas, tar, ammonia, &c., not only in quantity, but also in quality. It is frequently found—more particularly, perhaps, in the case of municipalities—that capital cost is the deciding factor in the choice of a new system, and that the gas production is the most important factor as far as the results are concerned. In order to make a real comparison, one thinks that it would be much fairer to take into account all the items mentioned above (say) for a period of five or more years. Of course, the argument against this method is that it is not possible to get such particulars of the latest systems; but it would be found, no doubt, that with a little pressure the builders of the various systems would be prepared either to furnish suitable information or give far-reaching guarantees on the points in question. Dr. Davidson's suggestion that a complete monthly return be made, including particulars about gas, fuel, tar, and liquor, is a very useful one; and when proper arrangements were made for such returns, it should not involve a great deal of extra work. It should prove to be of very great use to the gas engineer, and should be of great assistance to him in determining the total value of any particular class of coal.

CORROSION OF IRON BY DISSOLVED OXYGEN.

Early in the year a paper was submitted to the Yorkshire Section of the Society of Chemical Industry by Professor J. W. Cobb, B.Sc., the Livesey Professor of Coal Gas and Fuel Industries at the Leeds University, and Mr. G. Dougill, on "Corrosion by Dissolved Oxygen." It embodied the results of a series of experiments carried out to determine the extent to which dissolved gases might be responsible for extensive rusting in hot-water pipe systems. Such an investigation seemed to be necessary, because several cases of such rusting had come to the notice of one of the authors, when the water was satisfactory according to the ordinary chemical tests, and there was no reason to suspect abnormality in the iron. The text of the paper is contained in the number of the "Journal" of the Society for the 30th ult.; and from it we take the authors' conclusions, as follows: (1) That in our experiments a very large proportion of the dissolved oxygen in the water supply used for a simple heating system consisting of one pipe was not present in the water or gas leaving, but had been absorbed in the pipe. It was presumably used up in rusting the iron, and a large quantity of rust was actually formed. (2) That about half the loss of oxygen occurred in the first foot length of the pipe—the heater. (3) That the further loss of oxygen occurred in the 5 feet of pipe beyond the heated length, and could be prevented if the expelled gases were mechanically taken off at the end of the heated length. (4) That in small-scale experiments with pure iron foil the expulsion of dissolved gas from the water by previous boiling was an effective means of preventing rusting. (5) That in similar small-scale experiments it appeared that the rusting of iron foil could be almost prevented by treating the cold air-saturated water with the sodium hydroxide and ferrous sulphate necessary to take up the oxygen dissolved in the water supply.

Midland Association Commercial Section.

The Commercial Section of the Midland Association of Gas Engineers and Managers took the opportunity of meeting prior to the District Conference of the British Commercial Gas Association held at Leicester on Friday. There was a good attendance; and the Chairman (Mr. J. Ferguson Bell, of Derby) gave an address on the objects and aims of the Association, and expressed the hope that all the gas undertakings in the Midlands would join. Mr. Hubert Pooley moved a vote of thanks to Mr. Bell for his address; and Mr. Thomas Berridge seconded the proposition, which was carried unanimously. The remainder of the time at the disposal of the meeting was taken up in discussing the alteration of the rules, and several interesting topics.

Committee on the Smoke Nuisance.

It was stated some time ago that the President of the Local Government Board would appoint a Departmental Committee "to consider the present state of the law with regard to the pollution of the air by smoke and other noxious vapours, and its administration, and to advise what steps are desirable and practicable with a view to diminishing the evils still arising from such pollution." The names of the members of the Committee are now announced, as follows:—

The Right Hon. Russell Rea, M.P.
Mr. H. Brevitt, Town Clerk of Wolverhampton.
Professor J. B. Cohen, F.R.S., of Leeds University.
Colonel H. Hughes, C.B., C.M.G., a former Lord Mayor of Sheffield.
Mr. J. F. MacCabe, an Inspector under the Local Government Board for Ireland.
The Right Hon. Lord Newton.
Captain H. R. Sankey, late of the Royal Engineers.
Mr. B. Duncomb Sells, General Manager of the Machinery Users' Association.
Mr. P. C. Simmons, a member of the London County Council.
Mr. E. D. Simon, a member of the firm of Henry Simon, Limited, of Manchester.
Bailie W. B. Smith, a member of the Glasgow Corporation.
Mr. H. O. Stutchbury, a principal clerk of the Local Government Board.
Mr. Christopher Turner.
Sir Aston Webb, C.B., C.V.O.
Mr. E. A. Faunch, of the Local Government Board, will act as Secretary.

The sixtieth general meeting of the Institution of Mining Engineers will be held in the rooms of the Geological Society, Burlington House, Piccadilly, W., on the 4th prox.. under the presidency of Sir William E. Garforth, LL.D., M.Inst.C.E. On the programme is a paper by Mr. J. Davidson, on "The Development of the Internal-Combustion Engine for Power Generation at Collieries;" and a paper on "Further Researches in the Microscopical Examination of Coal, especially in Relation to Spontaneous Combustion," by Mr. James Lomax, which is already upon the "Transactions," will be open for discussion.

MIDLAND DISTRICT CONFERENCE

OF THE

BRITISH COMMERCIAL GAS ASSOCIATION.—LEICESTER, MAY 8.

UNDER the auspices of the British Commercial Gas Association, a Midland District Conference was held in the King's Hall of the Grand Hotel, Leicester, on Friday last. There was a good attendance, over which Alderman T. SMITH, J.P., the Chairman of the Leicester Corporation Gas Committee, presided.

The CHAIRMAN, at the opening, asked the Mayor of Leicester (Mr. J. Russell Frears) to offer a few words of welcome.

WELCOME TO LEICESTER.

The MAYOR said it gave him sincere pleasure to welcome them with great heartiness, not only because of the hospitable instincts they always felt in Leicester towards bodies such as this, but also because they knew that the labours the Association were engaged upon, and the aims they had set before themselves, were likely to do the public a great deal of good, as well as the members of the conference. They in Leicester had owned the gas undertaking for something like 36 years; and it had been a very excellent thing for the town that they had done so. Not only had they been able to supply gas of a very good quality to consumers at a reasonable price, but at the same time they had been enabled to make large profits and relieve the rates by substantial sums of money. There were many good reasons why the use of gas should be more widely advocated, and its advantages better known. For one thing, of course, they reduced thereby very largely the smoke and grime generally associated with commercial towns. He was happy to say that they in Leicester had always had a good name for being a very clean, bright town; and they wished to preserve this feature, and even extend it. By the use of gas, they would be able to preserve, and even to enhance, it. Then, again, by the extended use of gas they would, of course, be enabled to make bigger profits, and to render more successful the undertaking they were carrying on. This was the first meeting of the Midland District Conference; and Leicester felt honoured by being chosen for it. It was perhaps fitting, in one sense, that this should be so. They had just put in a new system of vertical retorts, with which they were very pleased. Great expectations were held out when they were considering this scheme—expectations which seemed almost too bright to be realized. But now the retorts were in working order, they began to see that the expectations would be fully justified, and that they were going to get all the benefits which were held out to them. They had a very good Committee in Leicester; and they had in particular a most excellent Chairman in Mr. Alderman Smith. They had also an engineer of whom they were proud, and in whom they had absolute confidence. They had been very fortunate for a great many years in their gas engineers—in the persons of the late Mr. Alfred Colson, and now Mr. Hubert Pooley.

Mr. T. BERRIDGE (Leamington) moved a vote of thanks to the Mayor for his welcome. He congratulated Leicester upon their beautiful gas-works, which were in excellent order and thoroughly up to date.

Alderman PINKNEY (Smethwick) seconded, and said that, instead of waiting for customers, nowadays gas men must be up and doing, and looking for them. As the Mayor had indicated, various changes must take place if gas was to hold its own.

The resolution having been carried unanimously, the MAYOR briefly responded.

Address of Welcome by Alderman THOMAS SMITH, J.P., the President of the Conference.

The CHAIRMAN, in adding his welcome, said: As a Vice-President of the British Commercial Gas Association, and as Chairman of the Leicester Corporation Gas Committee, it is a great pleasure to me to be able to preside over this conference and to heartily endorse the welcome to Leicester the Mayor has extended to you.

The Association meeting here to-day is, without doubt, of immense value to the industry as a whole; and I have been very gratified, and indeed much impressed, when comparing the last three Board of Trade returns of gas undertakings in the United Kingdom to notice the very large increase in gas sales which the industry has realized during these three years, and which may, I think, be attributed to a great extent to the efficient and universal propaganda work which the Association has accomplished. In the year 1910-1, the sale of gas was 182,833 million cubic feet. In the year 1911-2, the parallel figure was 189,046 millions—an increase of 6213 millions. In the year 1912-3, however, when competition from other sources of light, heat, and power were probably keener, the sales were 198,922 million cubic feet—an increase over the previous year of 9876 millions; this increase being quite 50 per cent. more than that of the first mentioned period.

This latter year (1912-3) was really the time during which the earliest efforts and first influences of the British Commercial Gas Association began to be felt; and I think it is only fair to assume that it is mainly due to the energetic publicity work the Association has accomplished that such very favourable results have already been obtained. It is very interesting to remember also that the difference between the two increases—roughly, 3600 million cubic feet per annum, and which is equal to at least the product from 300,000 tons of coal—is a larger output than that now enjoyed by such gas undertakings as those of the Newcastle-upon-Tyne Company or the Leeds Corporation.

Leicester has always been noted as being a progressive town; and what is true of the town is certainly equally true in regard to its gas undertaking. As the Mayor has told you, the works were acquired by the Corporation from the Gas Company in 1878; and during its 35 years' ownership, the Municipality has maintained the efficiency of its gas supply at the highest standard. Of our two works, which no doubt many of those present have visited during the morning, or, perhaps, at some earlier date, that at Aylestone Road, of a daily capacity of 12 million cubic feet, is a monument to the skill of the late Gas Engineer to the Corporation, Mr. Alfred Colson; while the older works at Belgrave Gate has recently been the scene, under our present Engineer and Manager, Mr. Hubert Pooley, of the first stages of its remodelling in the installation of vertical retorts and coke-handling plant.

I am pleased to say that, during the last two years, we have had an increase in our output of 7 per cent.; the quantity of gas sold in the year 1911 being 2034 million cubic feet, and in 1913, 2176 millions.

I have said that the Leicester gas undertaking is a progressive one; and this, I think, is borne out by the fact that we have made full use of the means by which gas companies and authorities are able to increase their sales, and so popularize the use of gas for lighting, cooking, heating, power, and industrial purposes. We have between 900 and 1000 gas-engines now at work; and out of 63,000 consumers for all purposes, over 53,000 have gas-cookers, while during the last six months, some 3600 gas-fires have been fixed in connection with the hire-purchase scheme the Committee have recently adopted.

There is no disputing the fact that in the supply of cheap gaseous fuel for heating purposes there is a great future; and it is in stimulating the ever-increasing popularity with which this method of heating is coming into favour that the work of such an Association as the one you represent is of the utmost value in bringing home the advantages of gas to the general public.

While there is, of course, no need to appeal to the converted or to teach the informed who are here to-day, it is the outside world which must be made to see that in this direction lies the (at any rate) partial solution of the smoke problem so common to our large centres of industry.

The Committee over which it is my privilege to preside have appreciated the efforts of the Association by becoming subscribers—realizing how great are the benefits which all gas undertakings throughout the country are deriving from a central publicity organization. If there are any representatives here of committees or directors of non-subscribing undertakings, I trust they may so report on this conference that they and their colleagues will without further delay fall into line, and contribute to the sowing of the seed from which they are undoubtedly gathering harvest. As a maxim in the last issue of the "Bulletin" reminds us—

> "Men are rich only as they give;
> He who gives great service gets great returns."

Alderman MITCHELL (Stoke-on-Trent) moved a vote of thanks to Alderman Smith, and to the Leicester Gas Committee for the arrangements they had made for the meeting. He said they had made great strides in the gas business. Gas cookers and fires were, he thought, a proper thing for gas committees and companies to go in for—especially in districts where they had to cope with much smoke. These two things undoubtedly did to a great extent reduce the smoke nuisance.

Mr. J. MARSHALL (Long Eaton) seconded, and said the use of gas helped to clear Manchester of much smoke. Despite the competition of electricity, gas still had a great future.

The resolution was agreed to; and Alderman SMITH returned thanks.

Mr. R. S. HILTON (Birmingham), the Chairman of the District Conference Committee, then read the following address.

Address by Mr. R. S. HILTON, of Birmingham.

It is a source of considerable pleasure to the District Conference Committee that the first local conference in the Midland district in connection with the "B.C.G.A." is taking place at Leicester, which boasts such a progressive gas undertaking, and which is so successfully administered by members of the Gas Committee, and by the Engineer (Mr. Pooley) and his officials. To all of these gentlemen we wish to express not only the pleasure with which we come to Leicester, but also our thanks to them for ensuring that we hold this first conference of the Midland district amid such pleasant surroundings.

I believe it is customary at these joint conferences to explain something of the work which the British Commercial Gas Association has undertaken; and it falls to me to give you some particulars in regard to its work. Much of it may be known to you

who are already members of the Association; but it will, I hope, influence in some small degree any concern which has not already been converted, to join with its fellow gas undertakings in this successful enterprise.

The "B.C.G.A." is now well into the third year of its existence. Starting with a large membership, it has year by year increased its boundaries, until it now represents 80 per cent. of the output of gas in the country. The Association is worked on broad lines which make for success. It has brought within the reach of all the best advertising matter in connection with gas, attractively set forth, and illustrated by the best black-and-white artists of the day. I am sure there can be no one here who at some time or other has not seen one of those ably-written articles or attractive sketches which I am convinced are doing so much good not only to gas undertakings individually but to the industry as a whole. For any single undertaking to obtain for itself the advantages, and reap the fruits of such advertising, I do not hesitate to say it would have to spend three or four times the amount of money which it pays as a subscription to the "B.C.G.A."

In these progressive times, it is false modesty to "hide our light under a bushel." We ought to show our patrons not only from the illuminating point of view, but also as a source of heating, the many uses to which gas can be applied; and we cannot afford to rest content with methods which have served well enough in the past. It is no longer possible to sit and wait for business to come to us; we must go out and look for it, and having secured it we must stick to it. Once having realized this, the natural sequence is the formation of co-operative methods for the whole of the industry. Hence the "B.C.G.A."

We have surely more to gain by advertising than most industries; for whereas most advertisements achieve their end with the sale of the article, the benefit to us is only then beginning. As long as we render our consumers good service, we are ensuring a source of profit which will add to the prosperity of our business for many years to come.

The work of the "B.C.G.A.," however, does not begin and end in advertising. One of its aims is to raise the general standard of this great national industry of ours; and with this in view it is carrying on educational work in an endeavour to make every gas salesman alive to the possibilities which present themselves at the present time for the extended use of gas, and to coach those people whose duty it is to represent to the consumer the case for gas and give advice as to the installing of apparatus, so that they may be competent, well-trained, and fully capable men.

The co-operation of the makers of gas apparatus with the gas companies, and the raising of the standard of quality in gas appliances are other results of the work of the "B.C.G.A.," and are convincing reasons why we should all join hands. There is little good in manufacturing gas cheaply if the consumer is unable to get apparatus through which he can use gas economically and to the best advantage. By working together, we can ensure that our customers will get the best possible results from every cubic foot of gas they consume.

The exchange of views between the gas apparatus manufacturer and the gas engineer and gas salesman must be beneficial; and I look forward to the time when the Association will be of such strength that it will have testing shops and laboratories of its own, so that gas apparatus may be submitted, and receive, as it were, the "hall mark" which will be accepted as the stamp of its efficiency.

It is not too much to say that as a result of the Association a new spirit of comradeship has been created among gas salesmen; and it only remains for the various districts, by conferences such as this, and by the ready exchange of information, to foster this spirit.

In a large organization there is always the difficulty that only a comparatively few members come into close contact with the inner working of the Association. To the general body of the members, the information comes in a sort of second-hand way; and it is for this reason that these district conferences have been arranged in order to link up the various subscribers one with the other, and to familiarize them with the aims and objects of the Association.

I feel confident that nothing but good can come of a general exchange of ideas at a conference such as this, coupled with intelligent criticism. Owing to the many channels into which the work of the central body has to be directed, it is manifestly impossible to supply all the local needs of the various districts, and to-day's meeting gives the opportunity for bringing to light the work which ought to be undertaken by the districts themselves.

If I may venture to make a suggestion, I think there is one direction to which this Midland district of ours might well apply itself; and that is in the training of the young men to help them to become the salesmen of the future. I should like to see monthly meetings of our salesmen (visiting each town in turn), at which subjects of interest to gas men could be fully discussed, where everybody would have an opportunity of expressing his opinions on any question connected with the sale of gas, and at which experts could state their views on any subject on which they specialize. We can all learn something from others; and if we give the young men (the associate members) the opportunity of learning, I feel confident that they will by their efforts attain the results we are striving for.

Competition in the future promises to be much keener than anything we have had to face in the past; and in order that this great industry may retain its premier position, we must realize that it is necessary for us to neglect no opportunity of satisfying the needs of the community nor any progressive methods for improving our position. We look to the young men of the profession to carry on this work.

In conclusion, may I heartily commend to all of you, subscribers and non-subscribers, the work which has been done, is now being done, and which still remains to be done with your whole-heated co-operation, by the "B.C.G.A."—work which has won golden opinions within the industry, and has even received praise from our friends and rivals in electricity. We in this Midland district are not accustomed to consider ourselves in any way behindhand in matters appertaining to the gas profession. Letus, therefore, strive to secure the premier place in loyalty to the "B.C.G.A.," and in the example we set to other districts.

Mr. G. E. Hilton (the Vice-Chairman of the Leicester Gas Committee) proposed a vote of thanks to Mr. R. S. Hilton. He said he was very pleased to hear the reference made to the Birmingham and Leicester Gas Committees. In Leicester, they were proud to know that for many years they had such an efficient engineer as the late Mr. Colson, who had come to them from Birmingham. No doubt there was a time in the history of the gas industry when they waited for business to come to them; but this time had gone. They had now to get business, and when they had got it to do their utmost to keep it. A most important point was that the younger men who had to effect the sales and do the business should be well trained and thoroughly efficient in their business. Another point was maintenance. Though they did not want complaints, they should not discourage them being made, because they wanted to know exactly the points which needed remedy.

Mr. J. Ferguson Bell (Derby), in seconding, said the Association had done, and were doing, a great work for the gas industry. They were living in changed times; and the result was that their methods must be changed. They must come in contact with the consumers, and let them know the advantages of their main product.

Mr. Hilton, in responding, said some people believed that gas show-rooms did not pay. In Birmingham, the profits they had made out of their show-room had paid the rent of the new offices they had been in for the past eighteen months. The show-room was proving not only a benefit to the Gas Department, but to the population of Birmingham.

SALESMANSHIP IN RELATION TO INCREASED GAS SALES.

A Paper by R. J. Rogers, of Birmingham.

Until the last few decades the study of salesmanship as a science received little or no attention at the hands of the large community of manufacturers and other sellers of goods or service, although history shows us that the art of selling and exchanging goods was practised by the ancients. Many examples could be quoted to show the effect of the application of business science on the sales of many commodities. My object in reading this paper, however, is not to define or explain the principles underlying salesmanship in its broad sense, but rather to endeavour to show that the adoption of scientific business principles, or "salesmanship" as it is termed, by a gas undertaking is calculated to exert a similar effect on increasing gas sales as the application of business science has on the sale of any other commodity.

Although the art of manufacture, distribution, and sale of gas apparatus has been a function of the gas engineer for over a century past, I think I may here venture to say that, until quite recently, many engineers and managers of gas undertakings were content to devote practically all their efforts to the manufacturing side of the business; the sale of gas and apparatus being left to take care of itself. Happily this state of affairs has undergone considerable change in most undertakings, although there are many concerns where the sales methods cannot be said to be consistent with the progressive policy of giving the best service to the customer.

Organization.

Until a few years ago, there was no organized effort on the part of the gas industry as a whole to deal with the many problems connected with the sales of gas, as distinct from the engineering and distributing departments of the industry. The need for closer co-operative action, and for some central organization to devote its energies to the increasing problem of gas salesmanship, became apparent; and less than three years ago the British Commercial Gas Association was formed. With the advent of the Association dawned a new epoch in the history of the gas industry, and new life and commercial enthusiasm were introduced into the ranks of all progressive gas administrators.

To attempt to deal with the broad aspect of salesmanship as applied to the sales of gas in all its phases would be impossible in a communication of this character. Salesmanship in the gas industry does not differ materially from salesmanship as applied to the sale of any other product. It is a science in which proficiency can only be obtained by first realizing its true significance, apart altogether from the nature of the goods or the commodity which the salesman may have to dispose of.

The study of salesmanship is not confined to large gas undertakings; it is equally important for the administrators of small gas-works to realize the possibility of the increased trade to be

obtained by conducting business on modern sales lines. Nor salesmanship confined to those who are responsible for selling gas apparatus and for attending to the wants of consumers generally. Each company director, each member of a gas committee, the works engineer, the secretary, and every other person (from the chairman to the employee in the most lowly position in the undertaking) are all factors which increase or diminish the efficiency of the business generally in proportion to the degree of salesmanship which they possess.

A Definition of Salesmanship.

Salesmanship does not consist merely in the power of selling apparatus to a consumer, but rather hinges on the manner in which the sale of the apparatus has been effected, the degree of success which the salesman may obtain in securing the permanent sales of gas, and the impression of satisfaction left with the purchaser. It does not necessarily follow that the salesman who brings in the most cash value orders is doing the best for his department. If the salesman can induce the consumer to use more gas through his existing apparatus by dispelling some deep-rooted prejudice which the consumer may hold, he will have done more good than simply taking an order for (say) a new gas-cooker or gas-fire.

The formation of a "sales of gas" or "commercial" section in the distribution department of a gas undertaking is a matter which many administrators of gas undertakings are considering at the present time; and the question as to whether the formation of such a section in their undertaking, in addition to the present distribution and fittings department, will be justified by results is naturally raised. In some of the great metropolitan companies, and in some few of the large provincial undertakings, the ever-increasing competition of electricity, and the clearer realization of the obligations of the suppliers of gas to the community, led a few years ago to the formation of special departments whose primary functions were to increase the sales of gas by exploiting new fields for gas usage; to conserve its existing consumption from the incursions of electricity and other rivals for light, heat, and power; to remove prejudices and advise consumers on the most up-to-date and economical systems of using gas for all purposes; to create more intimate relationship between the sellers of gas and the purchasers—in short, to give the utmost service to the community in its area of supply. Those companies and corporation gas departments who have already modelled their sales departments on modern lines are, I think, universally agreed that it is of undoubted benefit to the undertakings, and that the more efficient service they are thereby able to render to consumers is productive of satisfied consumers and increased gas sales.

Retention of Existing Consumption.

"New business" sections, as these special sales branches are termed in some undertakings, does not accurately convey the real functions of these sections, as, in addition to the energies of the salesmen being directed to obtaining new business, a good proportion of his time may very profitably be concentrated on the conservation of existing business. This question of the retention of existing gas consumption is not, in my opinion, sufficiently realized by many gas undertakings. It is regrettable to see in some districts the great amount of business which rival systems of light, heat, and power have secured from the gas undertakings, much of which business I feel sure could have been retained by the application of modern methods of salesmanship applied to the sales of gas in those localities.

The policy of waiting until the gas user has decided to instal other methods of power or lighting supplies is not conducive to progressive gas sales. So far as the undertaking which I have the honour to serve is concerned, there can be no question as to the success which has attended the adoption of the policy of the Gas Committee in formulating a Commercial Section in connection with the Gas Department.

Although an outline of the methods employed in the Commercial Section of the Birmingham Corporation Gas Department was contributed to the December, 1912, and January, 1913, numbers of the "Bulletin," I purpose making a brief reference to a few of the activities of the section, not with a view of describing in any completeness the organization and methods employed, but rather with the object of promoting a discussion on gas sales methods generally.

Birmingham Commercial Section.

About five years ago, the Gas Department decided to commence a Commercial Section as an adjunct to the Fittings Department. A commencement was made by the appointment of an experienced representative, whose first duties were to call upon architects, builders, estate agents, &c., to acquaint them with the latest methods of applying gas to the many problems of light, heat, and power which these gentlemen had to deal with in the course of their professional duties, and to impress upon them the fact that the policy of the Gas Committee was a "desire to serve" policy. The results of these efforts were very gratifying indeed. Many old prejudices were removed, many new converts to the possibilities of gas were obtained, and the architects and builders generally appreciated the advisory services which the department thereby rendered to them.

It was very soon evident from the results obtained that there was ample scope for the extension of this advisory service; and the staff of the Commercial Section has from time to time been augmented to deal with the increasing business, until to-day we have a trained commercial representative appointed for each of the eight districts into which the area of supply is divided. In each of the districts there is also a district inspector and a fittings inspector, in addition to the commercial representative; and all three work harmoniously together in conducting the business of the department in their district.

The commercial representative is responsible for attending to inquiries received, and for conserving and developing gas sales generally in his district. He also attends for evening duty at the branch show-rooms, when these are kept open until 9 p.m. on two evenings a week during the winter months, and is also in attendance at exhibition stands of the department during trades exhibitions, &c.

The Need for Advisory Specialists.

It is proof of the importance of the duties which a modern gas salesman has to perform when we realize that with some of the larger gas undertakings it has been found necessary to appoint advisory specialists to deal with many of the branches of gas-sales practice. In the promotion of sales by the use of water-heating apparatus, such as geysers, circulators, &c., we have in Birmingham an expert who devotes his time to advising consumers on the most efficient apparatus to instal, and also superintends the fixing of the apparatus by the plumbers who do the work under contract from the Gas Department.

In connection with the inspection and indicating of gas-engines, the department undertakes to examine and indicate gas-engines working in their area of supply, and furnish a report on their condition and efficiencies if required by the consumer. In view of the competition for power purposes which is now making itself evident in most undertakings, it is essential that every attention be given to the working of gas-engines to ensure that the greatest possible efficiency is being obtained from them. The periodical inspection of engines, and indicating them, is, in my opinion, as necessary as the inspection and maintenance of any other gas-consuming apparatus.

In addition to the commercial representative in charge of the district, we also have a special inspector who deals with new property, reports, and advises builders on the fixing of gas-pipes in premises. The advantages of having one inspector for this work are many. Our inspector has been successful in persuading builders to instal many gas supply pipes for cooking-stoves, gas-fires, &c., in new properties which would otherwise have been left out, and which would have necessitated laying gas-pipes in houses after they had become tenanted. He has been able to induce builders to leave T-pieces in the flow-and-return water-pipes when the houses are being built; so that in the event of the resident requiring to use a circulator later on, it may be installed without the trouble of disconnecting flow-and-return pipes. Gas wash-boilers receive very special attention at the hands of the buildings inspector; and in many properties these boilers are now universally adopted, to the exclusion of the old coal-heated copper. There are many other directions in which the new buildings inspector may prove of assistance to the builder and at the same time assist the department in selling more gas.

Householders are more likely to adopt gas fires, circulators, &c., if they are assured that the work can be carried out without causing the inconvenience of taking up floor boards, &c. It is therefore of the utmost importance to ensure that as many gas supply pipes as possible are installed during the erection of new property. In this direction a vigilant new buildings inspector can accomplish a good deal.

New Business and Property Reports by Meter Inspectors.

The value gas undertaking servants, such as meter inspectors, maintenance attendants, &c., in assisting the sales of gas section can be realized by obtaining reports of new business, badly-lighted premises, inefficient apparatus, and property in course of erection, noticed by them while they are traversing the district in the course of their duty. The inspectors, fitters, and maintenance men are brought into direct contact with gas consumers frequently throughout the year; and by keeping their eyes and ears open, they are able to report to the Commercial Section many matters which are afterwards followed up by the trained salesman, and which result in new consumption being obtained.

Each report, after being dealt with by the salesman, is given a certain mark according to the value of the report to the department; and on this the inspector receives a bonus. During the twelve months ending March 31 last, the number of new business reports from inspectors and others totalled over 8000; thus showing that the employees are an alert body and watchful of the interests of the department. Care should, however, be taken to ensure that inspectors and other non-technical men who are likely to be asked questions by the public should not enter into technical questions in any detail or advise as to particular types or sizes of apparatus, but that they should respectfully inform inquirers that a specialist will call and give them the information they require. Occasionally the meter inspectors visit the show-rooms of the department, where they are shown the latest types of apparatus for the use of gas.

Maintenance and its Effect on Gas Sales.

The visits of a representative of a gas undertaking to a consumer's premises after apparatus has been installed should not merely consist of the meter inspector and the collector of the

cash for the gas consumed, but more systematic and periodical visits of a specially-trained salesman or commercial representative. We all know that in other spheres of business the representatives or agents of the suppliers of the goods that are being sold —whether it be coal, oil, gas apparatus, or articles supplied for domestic consumption—call periodically upon likely purchasers, not always with the primary view of obtaining an immediate order, but rather to ascertain that the goods supplied are of a quality which is satisfying the consumer, and to listen respectfully to any complaints which the customer has to make concerning the goods used.

It is an axiom of commercial success that if new business is to be obtained the satisfaction of the purchaser must already have been assured by the service previously rendered by the supplier of the commodity. In order, therefore, that the representatives of the gas undertaking may be successful in securing new business we must see to it that the utmost satisfaction is given to our consumers with their present apparatus. This is a necessary preliminary to the successful securing of new business. Without this, the new business representative approaches his customer at a very great disadvantage. This satisfaction can be assured by adopting systems of maintenance and inspection whereby all appliances, whether they be gas-fires, cookers, burners, gas-engines, or other appliances, are periodically examined. Most engineers with experience of such schemes are agreed as to the value of providing an efficient maintenance section in assisting the work of their sales department.

The work of the various maintenance sections, such as burners and lamps, gas-fires, cookers, &c., is carried out in Birmingham by means of a card index system; and this has proved most satisfactory. In connection with the maintenance of cookers, a card is used for each cooker furnished to slot consumers and to those supplied on simple hire and hire-purchase terms. On this card is recorded all complaints received relative to the particular stove, also the name of the fitter who dealt with the complaint, the time he is employed attending to same, and the materials used, and the signature of the consumer certifying that the stove is left in order.

By means of this comprehensive record we are able to note at a glance the nature of the complaints; and if a repetition of the complaint occurs, we can immediately see the name of the maintenance attendant responsible. It also serves as a valuable check on the issue of cooking utensils—an item of maintenance which represents a substantial sum per annum in a department where upwards of 100,000 cookers are under maintenance.

Time will not permit of my dealing with the methods employed in the maintenance of other apparatus, which is dealt with in a similar manner to the system above-mentioned for cookers.

The practice of supplying apparatus, such as cookers, gas-fires, circulators, and outside lamps let on simple hire terms, has, I think, been fully justified by results in those undertakings which have adopted such hiring schemes. Notwithstanding these successes there are still many undertakings that have not yet decided to supply the requirements of consumers in this direction. The increased sales per consumer which have been secured in many districts have been due largely to the policy of giving facilities for consumers to use gas through various hire apparatus. The public do undoubtedly appreciate the fact that they may obtain apparatus without being faced with the initial outlay on same.

[The author here showed a diagram of the increase in the number of cooking stoves supplied on hire-purchase and simple-hire terms by the Birmingham Gas Department.]

The department commenced in November, 1907, to supply cookers on permanent hire terms of 1s. 6d. and 2s. per quarter to ordinary consumers; and although a system of supplying cookers on three years hire-purchase terms had been in vogue for many years prior to this, it is apparent, from the number of cookers supplied on permanent hire terms since the scheme commenced, that the majority of the consumers prefer to hire-out cookers rather than purchase them.

At the present time in Birmingham approximately 90 per cent. of the orders received for cookers from ordinary consumers are for those supplied on simple hire terms. Cookers are now supplied at rentals of 1s, 1s. 6d., and 2s. per quarter; and are fixed free.

The number of cookers supplied on hire-purchase terms to ordinary consumers up to the present time amounts to 19,000; the number of cookers provided and fixed free on permanent hire terms amounts to over 21,000, while the department has supplied and fixed free in the homes of slot consumers over 86,000 cooking-stoves. In addition to these there are many thousands of cookers which are the property of the consumers.

When we consider that in some undertakings the saturation point with regard to the placing-out of gas-cookers has been nearly reached—in some districts upwards of 90 per cent. of the consumers use gas-cookers—it is apparent that, in order to increase sales per consumer, other fields of gas usage must be sought. There still remains in most districts an enormous field for the exploitation of gas-fires and water-heaters; and if any proof were required to show the success which has attended the efforts of gas undertakings, we have only to refer to the returns of those undertakings that have already adopted hiring schemes in connection with gas fires and circulators.

In August, 1911, the Birmingham Gas Committee decided to hire out gas-fires on simple hire terms; and there has been a very rapid increase in the number of fires supplied since that date. At the end of March last, we had supplied over 27,000 gas-fires on simple-hire terms, and upwards of 5000 fires on hire-purchase terms. The old prejudices in connection with the use of gas-fires are being rapidly dispelled; and not the least significant fact in this direction is that the large majority of the medical profession in Birmingham are now using gas-fires in their houses. One doctor alone has in his house 23 fires; his consumption last year for heating and cooking purposes alone being over a million cubic feet—electricity being used for lighting. During last year there was a gratifying increase of 8½ per cent. over the consumption of previous years. Several factors contributed to this increase; the principal one no doubt being the continued adoption of gas, both high and low pressure, for industrial purposes, and to the extended use of gas fires and lamps on simple hire and hire-purchase terms. One consumer alone is responsible for using 65 million cubic feet of gas per annum at high pressure for metal-melting purposes, and several other consumers take from 10 to 40 million cubic feet each per annum. The average consumption by ordinary consumer has increased from 80,160 cubic feet for the year ending March, 1909, to 85,960 cubic feet for the year ending March, 1914.

Another satisfactory feature of gas sales is the increase in connection with the average consumption per automatic consumer. The figures were for the year ended March, 1912, 15,560 cubic feet; for the year ended March, 1913, 17,860 cubic feet; and for the year ended March, 1914, 19,870 cubic feet. The use of hired gas-fires by many slot consumers has no doubt contributed largely to this increase.

Discretion should always be used in the fixing of hired fires in the houses of slot consumers, as the indiscriminate fixing of them in many rooms of the poorer class of consumers may result in a large percentage of fires being returned on the score of expense. We have exercised care in this regard in Birmingham; and the percentage of hired fires returned from slot consumers' houses does not exceed those returned from the houses of ordinary consumers.

Qualifications of a Gas Salesman.

I had intended to describe the qualifications and essentials a gas salesman should possess in order to become proficient in his business; but as I have almost exceeded the time allotted for this paper, it is only possible for me to briefly indicate a few of the most necessary attributes of a successful gas salesman. First and foremost he should possess sound technical knowledge of the gas business, with its ramifications of distribution and supply matters. It is of primary importance that the salesman should be thoroughly familiar with the uses to which the commodity he has to sell is capable of being applied. Nothing gives more confidence to, or secures the good will of, the consumer (which is so necessary if increased gas sales are to be obtained) than the knowledge that he is being dealt with by a man who thoroughly understands his business.

About two years ago, in order that commercial representatives who had been recruited from the clerical staff in Birmingham might obtain an insight into the practical side of the gas-fitting business, arrangements were made whereby the commercial representatives acted as assistants to gas-fitters who were engaged in various branches of the practical work of the Gas Department. The representative consequently obtains first-hand knowledge of the practical difficulties encountered in all classes of gas-fitting work in the factory, the shop, and the houses of consumers. This experience is of the utmost value to him in after years when his duties necessitate him advising the consumer; and his value to the department is considerably enhanced.

Last year in Birmingham, in addition to the usual "Gas Supply" classes, a series of commercial lectures were formulated, dealing with many aspects of gas salesmanship, including advertising, canvassing, &c. This is a practice which I feel sure could be very profitably followed by other gas undertakings in the country, where the number of men engaged in commercial work would justify the formation of gas salesmanship classes for the benefit of those engaged in many of the smaller undertakings. Where it is not possible to form classes, and where it is equally important that the principles of gas salesmanship should be properly comprehended, suitable correspondence courses in "Salesmanship" could, I think, be formulated, which should result in profit both to the individuals concerned and to the industry generally.

Such an organized course of commercial study would, I feel sure, commend itself to many employees engaged in the sales of gas departments of gas undertakings, who perhaps hesitate at present to undergo a course of correspondence tuition in "salesmanship" through one of the existing correspondence schools, owing to the fact that the essential sales factors as applied to the selling of the particular commodity they are concerned with—viz., town gas—do not receive specialized attention by such schools.

We, as an industry, do not, I think, appreciate to the full the success which is capable of being obtained by a full realization of "salesmanship" in its broad sense as applied to the sale of gas, or of comprehending the inherent salesmanship qualities which many of those engaged in the industry possess, but which are lying dormant for want of some organized training or course to develop same. No matter how expert a man may be in the technical side of the business, his efforts as a salesman or new business representative will not be successful without he is possessed of other qualities which are of vital importance to a man engaged in selling gas.

Broadly speaking, a man's success as a salesman will be just in proportion to the extent of his possession of the qualities I shall hereafter name, *plus* the technical knowledge of his business. Perhaps the most important characteristics of the salesman, in addition to his technical knowledge, may be summarized as follows: Enthusiasm, courtesy, tact, honesty, faith, power of suggestion, persuasion, memory, consistency, and desire to serve.

Co-Operation between Sales and Fittings Departments.

All the representatives or salesmen connected with the gas undertaking should work harmoniously one with another. They should be agreed as to the value of the apparatus to fulfil certain functions and in the methods of approaching and dealing with consumers. In those undertakings where the commercial or new business duties are carried out by a special staff, it is imperative that the commercial representative or salesman should work in complete accord with the fittings department staff. The salesman canvasses and obtains the customer's order, and the fittings department representative is responsible for the satisfactory execution of the order—the two sections are dependent one upon the other.

The efforts of the salesman in obtaining the good will of the consumer may be entirely frustrated by lack of co-operation by the fittings department representative. The promise made to the consumer by the salesman in connection with any work to be executed must be followed precisely by the fittings department if the satisfaction of the consumer is to be secured. It is, of course, evident that no promise, either as to the method that will be adopted in carrying out a consumer's requirements or as to the time when the work shall be done, can be made by the salesman without he works in perfect harmony with the department whose duty it is to execute the work. It is, for many apparent reasons, of the utmost importance that the most cordial relations should exist between the members of both sections.

In Birmingham, meetings of the fittings and commercial staffs are held once in three weeks, when an address is given by one of the members. Addresses on hot-water apparatus, gas-fires, gas-engines, applications of gas to industrial processes, &c., have been delivered by the department experts, whose daily duties bring them into direct contact with the subject on which they speak. By means of these inter-sectional meetings, the salesmen are able to keep in close touch with the modern applications of gas in its many phases, and are enabled thereby to recommend to our customers the apparatus which is calculated to give them the greatest satisfaction.

The consumer who is ill advised by a gas salesman on any apparatus cannot be expected to place much faith in any subsequent advice he may receive from that salesman; and as one of the essentials of salesmanship is that the faith of the customer in the seller must be secured, it is apparent that any steps which may be taken to ensure reliable advice being given to the prospective purchaser of apparatus must tend to increase the selling power to every salesman in the department.

The kernel of the successful working of the whole business is service. From the engineer to the humblest worker on the gas-works, from the head of the office to the lowest office boy, from the head of the distribution or fittings department, through all sections of gas supply the whole success depends not on the efforts of any one individual, but on the total service rendered by all.

With a clearer realization of the benefits to be derived from the operation of modern methods of gas salesmanship which is now making itself apparent in many undertakings, there is undoubtedly at the present time a demand for fully-qualified gas salesmen—men who embody those essentials of salesmanship which I have referred to, together with a sound technical knowledge of the gas-sales business. It, therefore, behoves every student of gas salesmanship to study diligently the many aspects of business science, and to prepare himself for the opportunities of advancement which are certain to present themselves in the industry in the near future.

Every engineer is aware of the progress which has been made during past years in gas manufacturing processes, from crude carbonizing and purification methods, by the application of scientific principles of engineering and chemistry. Increased makes per ton continue to be obtained, and gas is produced at lower cost. In like manner I feel certain will the sales department of the industry progress by the application of the scientific principles of salesmanship, resulting in increased consumption per consumer and in better service and satisfaction to the community.

Notwithstanding the enormous developments which have taken place in the sales of gas departments during the past two years, I am sanguine that the coming years will find us more willing and eager to satisfy the requirements of our consumers, and that the gas industry will make for itself a reputation for giving to its patrons the best service that it is possible for any business organization to give to its customers. This condition of affairs will be brought about, not by the actions of a few progressive gas undertakings, but will depend very largely on the realization of salesmanship in its broad aspect every gas undertaking in the country.

No business organization must remain stationary if it is to be successful. The gas industry is continually developing; new spheres of activity are opened out; and new business is being obtained in all directions. For the continuance of this state of affairs we must depend to a large extent on the active mind of the active salesman or canvasser to exploit new fields of supply, and to see that good, reliable service is given, because in this rests to a large extent the laying of the foundations for future business and progress on which the industry must depend.

DISCUSSION.

Mr. Hubert Pooley (Leicester) said it afforded him great pleasure to move that the hearty thanks of the meeting be accorded Mr. Rogers. Like so many more of the problems which gas men had to tackle, that which had had their attention that afternoon was so brim full of matter of vital importance to the industry that it was a difficult thing for him who dealt with it to know from which side to attack his subject. It was certainly difficult for those who were connected with the larger undertakings to realize the difficulties of those whose sphere was smaller. He meant for the man in the 1000 million works to realize the difficulties of the man in the 20 to 100 million works. In the larger gas-works, the spending of a few hundred pounds was a small matter; but in the small works the spending of a £5 note needed careful thought. It was delightful for the rank and file of the industry to listen to, or read, such able contributions as they had had from Mr. Rogers; but to how many of them could the practical realization of such ideals come? The work of the conscientious engineer and manager in the smaller works was vast. He had to be everything to his employer, and his works could only afford to pay one man—he was going to say a "sufficiency." Should he alter the word, and call it a "living wage"? He could give them the case of a man only the other day who had done excellently well for his company, and who was actually discharged because competition was becoming keener, and his directors wanted a cheaper man. It was not necessary to exclaim at such a policy in a gathering of this description. What he had been driving at in his remarks was just this—the smaller companies could only afford to keep one man decently. The Association should appeal most strongly to the lesser undertakings; for they could get equal service to the larger ones at a minimum of cost, and the one "*multum in parvo*" of a man they employed could, and did, get from Mr. Mason and his colleagues inspiration and literature which were most helpful to him in his own commercial work. Mr. Rogers had told the tale of Birmingham gas. How he had made the mouths of some of them water! Ordinary consumers averaged nearly 90,000 cubic feet per annum, and prepayment ones nearly 20,000 cubic feet! He congratulated the Birmingham Gas Department, and envied them the fine field they had, which enabled such results to be obtained. In the early part of the paper, Mr. Rogers rather criticized the old-fashioned engineer and manager. He (the speaker) would feel very ungrateful if he did not recall some of the fine characteristics of many men who were as energetic in their time as present-day engineers. Their opportunities and their appliances were different; but they bore the brunt of the fight in their day. Birmingham had a wonderful market for gas. He thought possibly, with the exception of Sheffield and Newcastle-on-Tyne, there were no such markets in the country. They in Leicester had few industries which called for very vast quantities of gas; but they had, as the Chairman had indicated, realized the big field they had in front of them in heating gas, which had barely been touched as yet.

Mr. W. C. Jones (Brierley Hill), in seconding, endorsed what Mr. Pooley had said about the difficulties of the small gas undertakings. They could not afford to employ sufficient men to deal with the architects, builders, &c. The work devolved upon the manager; and this, on top of all his other duties, made it a very difficult problem in a progressive town. He, however, had received considerable aid from the literature of the Association. It had been of incalculable value in dealing with some of the problems which were constantly met with by the manager of a small town like his.

Mr. Ferguson Bell said they had seen the result of what had been done in Birmingham in the statistics of the increased consumption of gas. He was afraid that some of their undertakings were inclined to adopt far too penurious a view. Those of them who knew something of the inner working of very large industrial undertakings knew the enormous amount of money that was spent on commercial work. He firmly believed that it would pay the gas industry to spend more in this way. He was particularly interested in the suggestion made by Mr. Rogers in respect to the advisory specialists. He hoped their friends who were on the Executive Committee would bring this before the Association, so that some of them who could not go to the expense of a highly-skilled technical specialist might obtain the services of one for a week or a fortnight at a nominal fee. In many towns, there would not be more than a week's or a month's work for this specialist; and if they could have him for a short time, and then pass him on to another town, it would be a great advantage. He believed in America there was a sort of travelling gas exhibition; and he thought something of the kind might be done in England. He could speak from practical experience of the advantage of this co-operative work. There was no doubt that at Derby they had derived considerable advantage from working with the Association. There was one matter he should like to bring to the notice of those present, and that was in respect to the plumbers. As gas suppliers they had in the past, in many cases, hardly acted wisely in entering into active competition with the plumbers. It was a trade which they should make their friends. In most towns there were a large number of plumbers and gas-fitters; and if they could only make each a centre for the propagation of their business, it would be helping them, instead of the plumbers

being directly antagonistic. He believed something of this sort had been done in Birmingham; and he was happy to say that he had been able to effect a working arrangement with the plumbers of Derby. They had a meeting once a quarter to discuss prices; and the whole of the plumbers now were actively in favour of the gas undertaking. They must remember that tradesmen who were out to make a living were entitled to a reasonable profit upon the things they sold; whereas the gas company made profits on the quantity of gas distributed. He was thoroughly with Mr. Rogers when he laid emphasis on all connected with a gas undertaking working together in complete harmony, from the head to the office boy. In regard to the question of hire-purchase, in Derby they had a hire system for gas-engines, with quarterly payments extending over three to five years. They found that, whereas a manufacturer hesitated to scrap a steam-engine and pay a lump sum for a new gas-engine, he would sometimes make a change if he was allowed to spread the payments over five years. They looked upon the power consumer as the best customer they had; for he worked 54 hours a week the whole year round. They had adopted the system in Derby of making small contributions to builders to induce them to put sufficient piping in; so that if additions were needed, in the shape of gas-fires or anything of the kind, it was not necessary to take up the floors. Another matter that had not been touched upon was that of fixing lamps and maintaining them at an inclusive payment per quarter. This system had been exceedingly successful at Derby, and he believed in other towns as well.

Mr. W. M. Mason (Secretary of the Association) said he was a little surprised that a progressive man like Mr. Rogers should not have said more about the Association's literature. He knew Mr. Hilton and Mr. Rogers understood the value of it, from practical experience. To his (the speaker's) way of thinking, one of the greatest assets in salesmanship was the power of the printed word. They knew, or should know, in the gas profession the power of the Technical Press. He did not know any industry that was better served by its Technical Press than the gas industry. But there was power all round; and there was such a thing as neglecting power. He ventured to say the majority of those present did not realize the power that was lying ready to their hands in the printed word. Ruskin told of the great men of literature who were waiting for the ordinary public to come to them, so that they might give of their best; and he suggested that, in a degree, the same thing applied to them. The Association was doing a great deal in advertising; but there was another big feature—the literature which was prepared. Mouths had been watering, as they heard, for the good things of Birmingham. They could not all do like that; they could not organize like that. But he suggested that, in the literature they had, there was something which would meet the needs of even the smallest subscriber. There was this about it. Every representative had his limitations; but there were few limitations to good literature. There were limitations to speech and to interviews; but in the Association's booklets they had representatives speaking the best of English and coming directly in contact with customers.

Mr. H. C. Head (Winchester) said he had been struck by the immense possibilities there must be in Birmingham for selling gas. Mr. Rogers, in dealing with the special service the Birmingham undertaking was able to render, had made the small folk very envious. The largest gas company—the Gas Light and Coke Company—were very generous in lending their specialists to "smaller fry" around them. He would recommend this to the Birmingham Corporation. It was of immense advantage to the small man, and was not without benefit to the large gas undertaking to have their officers sent out into other fields and widen their experience.

Alderman Pinkney said that when they approached the question of electricity, they had the efficiency of the dynamo to consider. There was practically no variation—only about 3 per cent. There was one thing he should like to say by way of encouragement—and it was that the highest thermal efficiency of the internal combustion engine had not yet been reached by a long way. It required their assistance to make this prime mover more useful. It could only be done by reaching a standard of thermal efficiency of the gas. No gas-engine, as now constructed, would give the same results in two different towns. The thermal efficiency of gas varied to such a degree that often an engine was thrown out before it had had anything like a chance. He felt quite sure that in many cases gas-engines were looked upon as not economical because of this. If they could get one thermal efficiency—550 B.Th.U.—and one rate of compression, the gas-engine would become more efficient than at the present time.

The resolution was heartily carried.

Mr. Rogers, in response, said his remarks about the engineers of small works were not intended to be adverse criticism. They knew that in a small gas-works the engineer could not possibly devote time to the sales proper. The point he wanted to bring out was that in small works, as in large, sales must be looked after. In some of the smaller works he thought a great deal might be done by, perhaps, bringing out one of the better-class fitters, and allowing him to attend a course of training in salesmanship. This, in conjunction with the literature Mr. Mason had spoken of, would be extremely useful. In regard to the point of advisory specialists, this would receive the careful consideration of the Executive Committee. As to the question of outside lamps, he purposely omitted any reference to this, because he thought it demanded a separate paper. He might say that in Birmingham they had standardized the globes, so that one make of globe fitted the various types of lamp. With regard to advertising, he had included a reference in his paper originally, but cut it out because the paper was getting too long. There was no doubt that such advertising as they got from the Association was a very great help to the salesman.

The Objects of the Association.

The Chairman moved a resolution (similar to that passed at earlier conferences elsewhere) approving of the aims, objects, and policy of the Association.

This was seconded by Alderman John Andrews (Langley Mill) supported by Alderman Depree (Exeter), and agreed to; and the conference closed with a vote of thanks to the Chairman.

At 8 p.m. a lecture was delivered in the King's Hall of the Grand Hotel, by Professor Vivian B. Lewes, F.C.S., F.I.C., on "The Hygienic Value of Coal Gas as an Illuminant and a Fuel." This was followed by a reception (for conference delegates, and members of educational, medical, sanitary, health and other local public authorities, invited to the lecture) to meet the Mayor and Mayoress, the Chairman and Members of the Gas Committee, and the Aldermen and Councillors of the Corporation of Leicester.

STREET LIGHTING SPECIFICATION.

Suggested Clauses by Mr. Jacques Abady.

In the current number of the "Electrician" there is an article by Mr. Jacques Abady dealing with the subject of street lighting in relation to the standard specification proposed by the Joint Committee of the Institution of Electrical Engineers, the Institution of Gas Engineers, the Institution of Municipal and County Engineers, and the Illuminating Engineering Society, as given in a paper read by Mr. A. P. Trotter before the last-named Society, and noticed in the "Journal" for April 22, 1913 (p. 250). The propositions were severely criticized, because apparently it was felt that they would not fulfil their function of ensuring the best and cheapest street lighting by holding the balance fairly between all methods. In response to an invitation from the Editor of the "Electrician," Mr. Abady has endeavoured to place upon record some alternative suggestions; and we reproduce them below. He introduces them with some general observations which may be briefly summarized.

Having shown the utility of a standard specification, the author reminds readers that the proposals embodied in the standard specification were, firstly, that light values should be expressed as minimum horizontal illumination on a plane 3 ft. 3 in. from the ground; secondly, that, when possible, this value should be found by an illumination photometer; and, thirdly, that in the streets where this was not possible (computed at 80 per cent. of the total number) the minimum horizontal illumination should be calculated, for which purpose a table was attached to the specification. Mr. Abady says the fallacy of the method of comparison was clearly shown from the table itself, and the other weaknesses of the scheme (which, curiously enough, was unfavourably received by the gas interests, though what it would have obviously penalized was metallic filament lighting) were exposed in the debates upon the subject.

The author says he has no intention of criticizing in detail the "defunct proposals" in the light of the premises summarized above, but offers one or two general remarks on the relation of light sources and lighting effects, which appear to show that, for the purpose of fulfilling the conditions set out, it is quite necessary to measure the power of the source of light, and base the specification on this form of test. The standard clauses which he suggests should be included in the specification are as follows:

1. *Subject Matter.*—The subject matter of the contract is the lighting of all [or any] of the districts [streets] in the of set out in the annexed form of tender [and defined in the annexed plans].

2. *Installation.*—On or before the or within weeks of the contractor receiving notification of acceptance of his tender and authorization to proceed with the works, whichever shall be the longer period, the contractor shall provide any necessary mains, wires, pipes, apparatus, lamps, columns, brackets, suspension gear, lowering gear, glazed heads, burners, governors, valves, cut-outs, switches, shades, reflectors, and other fittings necessary for the satisfactory installation of the "lighting units," "lamps," "lighting fittings," "lanterns," and "lighting sources" specified and quoted for, and shall execute all incidental works of every kind, including the cost of making good any pavement disturbed [which last-mentioned work will be carried out at cost price by the council at the cost of the contractor].

3. *Execution of Works.*—The contractor shall provide all materials, labour, tools, tackle, implements, plant, water, and other necessary things for the proper execution of the works. All the materials used shall be the best of their respective kinds, and applied in the most workmanlike and substantial manner possible; and the works shall be erected to the entire satisfaction of the council's engineer, who shall have full power to reject any materials which he may consider unfit to be used in the work.

4. *The Lighting Units.*—The lighting units must be such as to yield a satisfactory and well-distributed light of the candle power specified, of a steady, unvariable character, and of a white or yellowish white colour; and, if called upon to do so, the contractor shall, previous to their installation, submit to the council details of laboratory tests which

he shall make, or cause to be made, so as to satisfy himself that such lighting units comply with the requirements of this specification.

5. *Substitution of Lighting Sources during Contract Period.*—If during the period of the contract the contractor wishes to substitute, at his own cost and expense, other "lighting sources" for those fitted at the installation of the "lighting units," and satisfies the council that such substitution will not affect the compliance of such "lighting units" with the terms of this specification and contract, the council shall not offer any objection to such substitution, even though the use of such substituted "lighting source" enables the contractor to comply with the terms of this specification and contract with the expenditure of a reduced quantity of electrical energy or gas.

6. *Annual Maintenance.*—The contractor shall provide the illuminant, light and extinguish the lamps, provide any carbons, mantles, lamp burner or glass renewals or any other fittings, keep the installation of "lighting units" in such a state of cleanliness and good repair, and generally do all such things as may be necessary to ensure the provision of the degree and quality of lighting specified herein.

7. *Lighting Hours.*—The "lighting units" installed and maintained under this contract shall be kept alight for hours per annum, in accordance with the schedule of lighting hours attached hereto. Provided that the council shall have power to vary such lighting hours by giving reasonable notice to the contractor, but shall not have power to reduce the annual maintenance charge (otherwise than by agreement) on account of any reduction in the annual number of lighting hours. Any increase in lighting hours shall be paid for by the council at a rate per hour proportionate to the annual maintenance charge.

8. *Fog Lighting.*—In case of fog the contractor shall put any or all of the lighting units in lighting immediately it becomes necessary, and shall charge per hour for same at a rate proportionate to the annual maintenance charge. The contractor shall deliver by writing to the council full particulars of any such extra lighting within 24 hours from the occurrence thereof.

9. *Candle Power.*—(*a*) The contractor shall, unless prevented by unavoidable breakdown of works, inclemency of weather, or other cause or accident beyond his reasonable control, supply the "lighting units" with illuminant so as to give the minimum candle powers respectively specified in the form of tender as directly measured by the council's portable photometric apparatus. The candle power shall be arrived at by taking the average of two sets of readings of the light under test—one set at an angle of 20° to the horizontal, and a second set in approximately the same direction, but at an angle of 50° to the horizontal, but so that the glazing bars or suspension arms, if any, shall not interfere with the photometer readings.

(*b*) The illuminating power of every lighting unit at 20° to the horizontal shall be not less than 15 per cent. more than the illuminating power at 50° to the horizontal. Not less than three and not more than six readings at regular intervals of not less than 30 and not more than 60 seconds shall be made at each angle; and the average of the readings shall be termed the reading or illuminating power at that angle.

(*c*) If upon a test being made the candle power, as defined herein, of any lamp falls below the prescribed standard, and is not more than 10 per cent. below it, a test may be made of each of the two nearest lights; and if the aggregate candle power of the three lights equals the aggregate required by the contract, no damages shall be recoverable.

(*d*) The photometer used shall be one working on the law of inverse squares, shall be so constructed as to read accurately whatever the respective colours of the light under test and the standard of light, and shall be mounted so that the observation screen shall be not less than 3 feet and not more than 4 ft. 6 in. above the ground level when set in the position to take horizontal readings. The photometer shall be capable of being verified by comparison with a Harcourt's 10-candle pentane lamp or an electric standard certified by comparison with a Harcourt lamp by the National Physical Laboratory, and shall be provided with such apparatus that it can be set to the correct standard of candle power when used in the streets for the purpose of this contract. Tests of lighting units under this contract shall only be made in reasonably clear weather—not during rain, mist, or fog.

(*e*) The contractor shall be entitled to be represented during a test, but shall not take part therein, for which purpose the council shall give to the contractor or his representative, one hour before lighting-up time, notice of the intention to test, which notice shall contain such particulars as will enable the contractor to be represented should he so desire. The contractor or his representative may request a verification of the photometer to be made in his presence at the conclusion of a series of tests on any evening.

(*f*) The photometrist shall, on the day immediately following that on which a testing has been conducted, make and deliver a report of the results of his testing to the local authority by whom he was appointed and to the contractor, and such report shall be receivable in evidence.

10. *Intention of Contract.*—The intention of this contract is that the contractor shall assure himself by continued test and inspection that the "lighting sources" he provides are, during lighting hours, fulfilling in all respects the requirements of this contract, and he shall not claim relief from the conditions of this contract on the ground of non-notification on the part of the council of any failure to comply with the terms of this specification.

11. *Penalties and Damages.*—(*a*) The contractor shall pay to the council the sum of per day as liquidated damages for every day during which any part of the work specified in clause 2 hereof shall remain uncompleted after the period stipulated therein; but in the event of delay to the works due to bad weather or other unavoidable causes, or by reason of strikes or combinations on the part of workmen employed, the engineer to the council shall allow such additional time as he may deem fair and reasonable, and his decision shall be final.

(*b*) The contractor shall pay to the council as liquidated damages the sum of per day or portion thereof for every "lighting source" not supplied with illuminant or not giving at the time of testing the specified candle power provided for in this specification and form of tender, each day commencing at twelve midnight.

12. *Painting.*—This should be part of the maintenance. It will vary, both as to the number of coats required and the periods between each re-painting, according to local requirements; and the clause should be worded accordingly.

Mr. Abady considers that the schedule of lighting hours should set out the times for lighting and extinguishing and the number of hours the units are to be lighted; and that it should contain a proviso giving the contractor 20 or 30 minutes' margin on each side of the lighting-up and extinguishing times, so as to allow for the average time of lighting and extinguishing to coincide with the times specified in the schedule. If the contractor is required to extinguish any lighting units, or part of any lighting units, at half time, a table showing the details of the total lighting hours required for such "half-night" lamps should be included.

After some remarks on the form of tender, which, of course, cannot be standardized, Mr. Abady explains how the candle power contract will work in practice, and how it can best be put to practical service by councils. He says it involves the selection by the engineer or surveyor to the council of the candle power, the height from the ground, and the distance apart of the lighting units. In this sense it places upon the council's officer the responsibility of the arrangement of street lighting, which the author believes to be the right course, and one which is almost invariably followed in practice. If, however, an engineer wishes to alter the type of his lighting, with respect to height and distance, Mr. Abady reproduces, from his paper before the Institution of Gas Engineers in 1910, a table which will prevent him from falling into any erroneous comparison as to the value of lights placed at different heights, together with his remarks thereon.* The spacing of the lamps is not dealt with; but the author gives a table which he thinks will be useful for reference.

Mr. Abady's final remarks have reference to the testing clause (No. 9) of the specification. He points out that tests at two angles are recommended—viz., at 20° and 50° to the horizontal. He says that these are selected because they give a good idea of the ratio between the "near" and the "distant" lighting, and because their mean will afford a rough approximation to the mean hemispherical intensity. They are both definite positions which can be found at once (because a portable photometer is fitted with an angle finder); and a desirable feature is that they leave no discretion to the photometrist as to the choice of a spot whereon to test the light. The test position is thus standardized and definite. He also points out that the testing clause specifies that the candle power at 20° must be at least 15 per cent. more than that at 50°. This is based upon the writer's experience as to what is desirable and practicable in this respect. It will naturally be understood that light rays at 20° have a longer distance to travel than light rays at 50°, and so should have an initial superiority in candle-power. The proportions suggested will prevent "glare."

In conclusion, the author trusts that an examination of his notes will reveal the fact that the method of testing recommended by him affords a fair means of comparison between arc, half-watt, metal filament electric lighting, and high and low pressure gas lighting.

* See "JOURNAL," Vol. CX., p. 799.

Counteracting the Effect of Yellow-Red Rays.

Artificial light, particularly that produced by means of carbon or metal filament electric lamps, incandescent mantles, &c., does not perfectly replace daylight, as it does not possess its whiteness. In such light the yellow-red rays are present to a greater or less extent, and consequently the objects illuminated by it do not appear in their natural colours. Moreover, the light is fatiguing to the eyes, and is dull when compared with daylight. Mr. Paul Grosheintz has taken out a patent for France [No. 464,888] by which, it is claimed, these inconveniences are avoided. The light-source is surrounded by glass tinted a cobalt blue to absorb the excess of yellow-red rays; and it is stated that the glass no longer appears blue nor the light-source yellow-red—both being colourless. Care has to be taken in the selection of the colour to be employed. Only cobalt blue can be utilized—not, for instance, ultramarine, or blue obtained with oxide of copper. The loss of light caused by the blue filter is amply compensated for by the better quality of the light produced. The filter can be placed either directly or indirectly before the light-source. In the former case, a cobalt blue globe will be used instead of a white glass one; while in the latter a shade of this colour will be similarly placed, and surrounded by a white globe.

At last night's meeting of the Society of Engineers, a paper entitled "Notes on the Water Supply of Greater New York," by Mr. William T. Taylor was read, of which the following is a synopsis: General description of works—statistics of population—Catskill water system—comparison of cost of work with that of the Panama Canal—organization of Board of Water Supply—Ashokan reservoir—Kensico reservoir—tests of concrete and metal used on the works—venturi meters—two statistical appendices.

The Bridge House Estates Committee of the Corporation of London have granted the use, before its demolition, of the vacant building in Adelaide Place, London Bridge, recently occupied by the Pearl Assurance Company, Limited, for a temporary exhibition of matters of civic interest. Provision will be made for showing articles and records illustrating the rise and progress of the water undertakings of the kingdom and the present-day supply and uses of water in modern cities as developed since the period when, from the Thames at London Bridge, the citizens were supplied from the historic "Water House."

BYE-PRODUCTS OF METALLURGY.

Utilization of Coke-Oven and Blast-Furnace Gas.

At the Annual Meeting of the Iron and Steel Institute, which opened at the Institution of Civil Engineers last Thursday, the President—M. ADOLPHE GREINER, of the Cockerill Works, Seraing—devoted his Inaugural Address to the subject of the bye-products resulting from present-day metallurgy. The following are the portions of special interest to "JOURNAL" readers.

RETORT COKE-OVENS.

We have left far behind us the time when everything was sacrificed to the production of a beautiful silvery, metallic-looking coke, such as that of the celebrated beehive ovens of Durham, which formerly discharged into the atmosphere torrents of smoke, and at night lit up the skies and the vicinity at the expense of a proper yield of product. Whatever system of coke-ovens is employed, the essential condition is, of course, the production of a coke of the very best quality, as the blast-furnace will not submit to the use of an inferior fuel, irregular, half coked, varying in hardness, in porosity, or in density; and everyone who has had the management of blast-furnaces well knows that there is no falser economy than to employ an inferior coke. But since 1880 progress has been made; and from any of the modern coke-ovens coke of the requisite quality may be expected and obtained.

Coke-Oven Gas.—This gas, which is exceedingly rich in calories (3700 to 4000 per cubic metre), was formerly used almost exclusively in heating the coke-ovens themselves; being carried away by flues beneath the bottom of the retorts or between the walls, and burnt with the aid of unheated air admitted through openings on the outside. The burnt gas passed under boilers, where it served to produce fairly approximately the amount of steam required for the ovens and for the manufacture of sulphate.

It is somewhat astonishing that so many years should have passed before the advantages of burning the gases by heated air should have been taken into consideration. The application of Siemens regenerators would appear to have been plainly foreshadowed. It is possible that manufacturers shrank from the expense; otherwise regenerative ovens would have been introduced long ago. Thanks to regeneration, 50 per cent. of the gas is, as a matter of fact, saved; and it is permissible to say that the saving will not stop at this, and that the important heat losses, due to charging the coal and to the discharging and quenching of the coke, will also be reduced. Besides this, it is found on studying the heat balance-sheet of the working of a coke-oven, that the calorific energy absorbed by the distillation proper of the coal is of very little importance as compared with the heat losses of every other description. On the other hand, if the process of the distillation of coal and of the heating of the walls and hearths of the furnace had been more accurately reasoned out, it would almost certainly have been recognized that the gas from coke-ovens is of far too rich a quality to be employed for such purposes, and that it would be much better to reserve it for other metallurgical uses, and to substitute for it a gas of poorer quality, yet sufficiently rich to produce the desired calorific effect.

It should also be noted that coke-oven gas, which is rich in methane, can only be employed in the cold state, as some of its most valuable elements of combustion are decomposed by heat. The following table shows the average composition and heat values of the gases most frequently employed in the industry:

	Coke-Oven Gas.		Producer Gas.		Blast-Furnace Gas.
Hydrogen	57	..	12	..	3
Carbon monoxide	6	..	19	..	26
Carbon dioxide	2	..	8	..	11
Methane	23	..	2	..	0
Nitrogen	12	..	59	..	60
	100	..	100	..	100
Calories per cubic metre	3761	..	1068	..	873

These data, which vary at different works, are those obtained in the laboratory at Seraing. Now both experience and calculation show that the temperature of combustion of a mixture of producer gas and air heated to 900° C. reaches 1980° C., which is practically equal to the temperature of combustion of a mixture of cold coke-oven gas with air heated to 600° C., which reaches a temperature of 1940° C. A mixture of blast-furnace gas and air, both heated to 900° C., yields a temperature of 1920° C. It follows, therefore, that if the gases from producers or from blast-furnaces can be obtained cheaply, it is highly advantageous to use them for heating the coke-ovens, and to reserve the richer coke-oven gas for other metallurgical uses.

With regard to the value of these different gases, it should be viewed in proportion to their calorific power and in comparison with the value of the fuel for which these gases may be substituted. This depends, therefore, on local conditions, and on the nature of the use made of the gases. In the particular instance of the Cockerill Works at Seraing, which are under my control, the following values per cubic metre have been arrived at:

Coke-oven gas (in open-hearth furnaces)	0·15d.
Coke-oven gas (for power purposes)	0·12d.
Purified producer gas	0·07d.
Washed blast-furnace gas	0·03d.

Tar, Ammonium Sulphate, and Benzol.—There exist at the present day numerous systems of coke-ovens—the Semet-Solvay, the Coppée, the Collin, the Koppers, the Otto, and others, which pour upon the market large quantities of bye-products. From a ton of coke there are obtained 25 to 40 kilos. (55 to 88 lbs.) of heterogenous and viscid liquid tar, the commercial value of which constantly rises, and which is usually sent by the works to factories, where it is submitted to fractional distillation, to yield industrial oils of very varied composition. In default of petrol, the Diesel motor works well with these products, and may in the future become a large consumer; the aniline dye works are also an important outlet for some of these hydrocarbons, among which naphthalene is also included.

In the construction of roads, a large quantity of tar is likewise employed; while what may become a fresh source of profit for the tar derivatives is the direct manufacture of pitch for the progressive industry of the briquetting of fuels. Nearly a half of the tar treated is employed for this purpose. Within the last few years, 80 to 90 per cent. of pitch, having a remarkably high agglutinative power, and competing strongly with ordinary pitch, has been produced from the tar by a special process of oxidation. A works to carry out this process has been established near Liége. After having been deprived of their tar, the gases deposit their ammonia in leaden troughs containing sulphuric acid. The ammonium sulphate thus formed represents a weight of from 11 to 13 kilos. (24 to 28 lbs.) per ton of coke. The salt is perfectly white, provided that care is taken to prevent it being contaminated by the last traces of tar.

By means of new and highly interesting methods, the very sulphur of the coal itself is brought to combine with the ammonia. It would not appear, however, that finality has been reached in the methods introduced in certain works by Burkheiser and Feld; but it may be seen to what extent it is sought to derive profit from the whole of the elements contained in the coal, including those which contaminate it. The ammonium sulphate, which is worth about 300 frs. (£12) per ton, is used chiefly as manure. Its consumption continues to increase; and the 600,000 tons which were used in 1900 became 1,300,000 tons in 1912, and will likely exceed 1,500,000 tons in 1914.

You are aware that new nitrogenous manures are produced in Germany, Italy, and particularly in Norway, by the direct fixation of the nitrogen of the air by means of electricity; but the competition of the cyanamides and of the nitrate of calcium obtained by these processes is not as yet to be feared. On the other hand, the production of natural Chilian nitrates, which amounts to 2,500,000 tons per annum, will not increase during the next few years; so that the ammonium sulphate from coke-ovens has before it a future which is the more promising inasmuch as the demand for nitrogenous manures will undoubtedly increase.

Finally, benzol is another bye-product of the manufacture of coke which has numerous uses. It yields on distillation the petrol (benzine) of the automobilist, and is used also as a solvent for india-rubber; 6 to 7 kilos. (13 to 15 lbs.) are obtained per ton of coke.

Even after all this there remains, finally, the rich gas, the use of which in the early stages was restricted to gas-engines like the blast-furnace gas; but its high calorific energy naturally predestines it to metallurgical uses in metal mixers, open-hearth furnaces, re-heating furnaces, and similar employments. In these various applications the heating of the coke-oven gas is exceedingly simple. It is, of course, necessary to adjust the burners to the working hearth of the furnace, the dimensions of which are determined in accordance with the teachings of experience. There is no more difficulty in running such a furnace than there has been in the United States in running furnaces on natural gas. In 1912 the United States consumed 15,750 million cubic metres of natural gas of 7000 calories per cubic metre, at an average price of 0·265d. per cubic metre—a total value of 417,000,000 frs. (£16,680,000).

The amount of gas evolved by a ton of coal may be estimated at from 300 to 350 cubic metres (10,500 to 12,500 cubic feet). After passing through the recuperators, this gas contains only a little sulphur dioxide and sulphuretted hydrogen, which it is necessary to eliminate, particularly when the gas is used in gas-engines. This purification is effected by making the gas pass through layers of iron oxide spread in the chambers. It is advisable likewise to instal a gasholder, not only because it allows of the composition of the gas and of the pressure at which it is delivered to the furnaces (which is highly important, particularly for the successful working of open-hearth furnaces) being rendered uniform, but also for storage purposes during the period when the steel-works are stopped, such as from Saturday to Monday or during public holidays. It may be imagined that these gasholders must always be of enormous capacity, and that their installation must be expensive; but their cost price would soon be redeemed by the advantages to be derived from the additional quantities of gas rendered available. For example, the gasholder at the Cockerill Company's works cost 500,000 frs. (£20,000), and has a capacity of 50,000 cubic metres (1·76 million cubic feet). Assuming that the open-hearth furnaces are working only 300 days per annum, it would serve for the collection as a minimum of $65 \times 50{,}000 = 3{,}250{,}000$ cubic metres of gas of the value of 0·15d. per cubic metre. The annual saving would thus be 48,750 frs. (£1948).

Another use for coke-oven gas which is becoming current practice is the lighting of towns and works. Indeed, the distillation of coal in the coke-ovens differs in nowise from that of coal in a retort. The average lighting power of coke-oven gas is, however, lower than that of ordinary lighting gas; but this defect can be rectified by the use of Auer burners, which turn to advantage the

calorific power. In any case, in order to satisfy the conditions of proper lighting, fractional distillation is employed.

During the coking of the coal the composition of the distilled gases varies from hour to hour. Gases which contain the heavier hydrocarbons, and are driven off earliest, are separated from those which are more suitable for heating purposes. Two hydraulic mains with the requisite taps are employed. Enormous installations have been at work during the last few years in Westphalia under exceedingly severe specifications, which fix the calorific value at 5000 calories, and stipulate for guarantees of purity from ammonia, naphthalene, tar, sulphur, water vapour, carbon monoxide, and carbon dioxide. Some towns, such as Barmen, receive their lighting gas through mains 50 kilometres in length from the generating works. This town consumes 17 million cubic metres per annum, at a price varying from 0·3d. to 0·5d. per cubic metre, whereas town gas costs double.

In Belgium a number of coke-works are preparing to light the towns; while the town gas-works, when increasing their means of production, do so by the installation of coke-oven batteries rather than of retorts. In England there are several central gas-works; among others, the works established some years ago by Mond, whose reputation is world-wide. In America, a number of towns are at present lighted by coke-oven gas previously purified. Finally, there may be instanced, as a possible application for coke-oven gas, the direct manufacture of nitric acid by the process actually investigated by Professor Häusser. Also, it is being sought to obtain from these gases the hydrocarbons, the derivatives of which are found in india-rubber; and certain experiments undertaken in this direction permit of the foreshadowing of the manufacture of artificial rubber.

Blast-Furnace Gases.

For a long time past blast-furnaces have ceased to be "beacons of industry," according to the phrase employed by Victor Hugo in his account of his travels in the Liége district. The tops have not, however, been completely closed up for more than about thirty years; a good number of engineers claiming that it was necessary to inspect visually the uniform descent of the charge. But, even with open tops, a portion of the gases from the throat of the furnace had already served to heat the hot-blast stoves, which were formerly composed of cast-iron tubes of varying shapes. A considerable improvement in their method of working was introduced by the employment of gas subjected to preliminary cleaning so as to remove the dust which fouled the chequer-work of the stoves and choked up the channels.

Numerous appliances have been invented for the purification of blast-furnace gases, which sometimes contain up to 20 grammes of dust per cubic metre. Generally speaking, capacious reservoirs with culverts of large diameter suffice to effect preliminary purification. By reducing the rate of flow of the gases, more than 50 per cent. of the coarser dust becomes deposited by this simple static process. When, however, it is desired to reduce the percentage to 0·1 gramme of dust or even lower, dynamic processes have to be employed. That is to say, the gases have to be centrifugalized with water-sprays.

Some years ago doubts were raised as to the advantages of purifying gases prior to burning them under boilers; the opinion being held by some persons that the expense entailed by the cleaning was not counterbalanced by a superior yield in steam-raising capacity. But, practically, the question has now been solved; and it may be said, speaking generally, that it is better, from every point of view, to discharge the dust in the form of mud into rivers and into the sea than to discharge it in the form of smoke into the atmosphere. When circumstances prevent this, it is necessary to have recourse to settling-troughs, which are less convenient.

The production of cheap oxygen by the fractional distillation of liquid air probably carries with it in reserve pleasant surprises. The trials carried out in Belgium in enriching the oxygen of the blast have been very encouraging. It is usually estimated that with the means employed one-half of the gas emerging from the furnace tops is absorbed in Cowper stoves, and that the remaining half is available for gas-engines or boilers. We know, too, that, given equal power, a gas-engine consumes less than half the amount of gas consumed beneath the boiler to supply even the most perfect steam-engine; while most metallurgical works in Europe have made the installation of gas-engines the general practice. Such engines are now found in all countries, including Japan, China, and the Indies.

The number of gas-engines at work of more than 200 H.P. is estimated at over 900, representing an aggregate of at least 1,500,000 H.P.; while to these figures must be added those in the United States of America. Belgium occupies a highly honourable place among the great industrial nations, with 94 gas-engines developing a total of 128,000 H.P.

We have travelled far from the initial stages of 1895, when I brought before the Institute the preliminary results obtained at the Cockerill Works with the Delamarre-Debouteville engine, and when I had decided on the use of uncleaned blast-furnace gases, after trials of a small 8 H.P. motor, which I subsequently modified. I would, in this connection, pay to the memory of B. H. Thwaite the tribute he deserves for having made known the results of the earliest experiments carried out at the works of the Steel Company of Scotland, under the management of James Riley, and those of the experiments at Doncaster, and for pointing out the advantages conferred by the direct utilization of blast-furnace gases for the production of electrical energy. The pioneer's untimely death prevented him reaping the fruit of his investigations.

The first more definite results in this direction were furnished by Professor Aimé Witz, who has recorded in the "Journal" of the Institute the results of the highly elaborate experiments carried out by himself and Professor Hubert in July, 1898, at Seraing. Within a few weeks there will be put into operation at these works the most powerful gas-engine hitherto constructed. It will develop 8000 H.P.

What progress has been made, too, in engineering! Within fifteen years we have witnessed the almost complete transformation of the means of producing motive power on a large scale. On the one hand, the gas-engine has practically solved the rational utilization of blast-furnace and coke-oven gases; on the other, the steam-turbine extracts from the coal a far greater amount of energy than the piston engine ever rendered available. Does the future hold in further store for us the promise of the gas-turbine? Possibly so, though up to the present the ascertained results have not been very encouraging.

In the meanwhile, the central power stations of metallurgical works continue to develop. Many such stations possess from five to ten gas-driven blowing-engines, and ten to fifteen motor generator sets developing sometimes an aggregate of over 30,000 H.P. They are fed with coke-oven or blast-furnace gas—sometimes with both—after complete purification. Experience has shown that, after six months' running, the dust deposits, even in the most tortuous windings of the cylinders, are scarcely appreciable, provided the gas does not contain over 0·025 gramme per cubic metre. On the other hand, if the cooling water is not too hard, the cleaning of the deposit from the cylinder walls need only be effected every second or third month.

Look likewise at the advantages that may be derived by the utilization of the gases, by combustion, on their leaving the engines. The 500° of heat they carry off with them yield, in appropriate boiler plants, an amount of steam which can be used in machines of different descriptions, or, better still, in turbines. Careful experiments have established that by these means from 10 to 13 per cent. of the effective energy of the gas-engine can be recovered.

Other Products.

The gases are not the only bye-products of pig iron. There are also the slags, the annual production of which is estimated at close on 200 million tons, which accumulated, in enormous tips, in the neighbourhood of works, encumber land, which often, in the course of years, acquires considerable value. The endeavour to turn them to profit is a problem deserving of the closest attention of metallurgists. When the slags are acid, they are made to serve for the manufacture of slag-wool, formerly employed as a heat-insulating packing; but since the bulk of the slags have become calcareous, it has been in the direction of the manufacture of artificial cements that ingenuity has been brought to bear upon their employment. A mixture of 70 per cent. of clinker and 30 per cent. of granulated slag, finely ground, yields a cement of superior quality known in Germany as "Eisen-Portland," and accepted during the last five years under the same category as portland cement by public administrations and the International Sales Syndicates. The cement industry has grown greatly of recent years. It is estimated that the annual European production of various slag cements reaches the figure of a million tons; and this amount will not fail to increase. To this must be added the enormous output of the Steel Trust, whose cement works have just been considerably enlarged.

The important development of the use of ferro-concrete further opens up to their use a promising future. Side by side with cements there is being carried out, at many works, the manufacture of bricks. Another bye-product which possesses importance is that derived from the heavy dust recovered from the dust-catchers, which has a composition closely approximating to the ores employed in the furnace burthen. The amount varies greatly, according to the nature of the ores used.

Concluding Remarks.

Side by side with the economies of to-morrow there are those which yield all the bye-products I have already enumerated, and from which metallurgical works derive greater or less profit, according to the degree of perfection attained by their coke-ovens, the state of their blast-furnaces, and the use they make of their available gases.

If a metallurgical works produced itself, in regenerative coke-ovens, all the coke required for its blast-furnaces; if it manufactured bricks and cement from its slag, and found in its steel-works application for all the available gases, either in its open-hearth and its reheating furnaces or in the production of motive-power, it would effect, per ton of pig iron, profits which may, in detail, be shown as follows:—

		s.	d.
Coke-ovens, per ton of coke	Sulphate, tar, and benzols	3	9½
	200 cubic metres of gas at 0·12d.	2	0
Blast-furnaces, per ton of pig iron	Cement, bricks, and slag	0	7½
	1250 cubic metres of gas at 0·03d.	3	1½
	Recovery of dust		?
Total per ton of pig iron		9	6
Or per ton of steel ingots		11	2
Or per ton of rolled steel (rails, girders, sections, bars		12	6

without taking into account the profits yielded by the sales of the

basic slag. What an income for him who would know how to realize it!

I think I have sketched a sufficiently complete outline of the progress made during some twenty years in the recovery and application of the bye-products of steel-works. Will the progress stop where it is? I doubt it. Every improvement leads to a fresh one, and each day sets the goal of progress farther ahead. Just as electricity has permitted of the centralization of motive power and of its economical distribution, so the centralization of the resources of metallurgical gases and their ready transport to the various points of their utilization bestow upon metallurgical works enormous advantages. To the huge saving in fuel which results from the utilization of coke-oven and blast-furnace gases for the production of motive power must be added those which are realized by the numerous applications of heating. The study of suitable burners, the general employment of efficient reheaters, and the means of perfect adjustment and complete control, will conduce to even greater saving. Finally, the cost of labour and the running expenses—other important factors of the cost price—are similarly reduced to a proportional extent. By these means our metallurgical industries succeed not only in producing cheaply, for the general need, but they show themselves provident in safeguarding for future generations the wealth that Nature has, with great generosity but not inexhaustibly, implanted in the soil.

Appendix.

In an appendix to his address, the President gave the following calculation of available gases:

Coke-Ovens.—1 ton of coal yields 300 cubic metres of gas; therefore there is obtained, per ton of coke $300 \times 100 \div 75 = 400$ cubic metres (14,126 cubic feet). In modern regenerative ovens, half the gas is available = 200 cubic metres, or 7060 cubic feet. Its value ranges from 0·12d. to 0·15d., according to the use made of it. The whole of the available gas can be utilized, for it is possible to store up in gasholders the output made during periods when the steel-works are stopped.

Blast-Furnaces.—1 ton of pig iron requires for its production 1 ton of coke, and 1 ton of coke yields 4500 cubic metres (159,000 cubic feet) of gas, of which 40 per cent., or 1800 cubic metres (63,500 cubic feet), is available. The gas is, however, lost during the stoppages of the steel-works, because its volume is too great to be stored; and in practice only 1250 cubic metres (44,000 cubic feet) can be utilized. Its value is 0·03d. per cubic metre.

RECOVERY OF COKE AND BYE-PRODUCTS FROM PEAT.

Dr. Perkin's Investigations.

At a Meeting of the London Section of the Society of Chemical Industry, recently, a paper dealing with the above-named subject was read by Dr. F. Mollwo Perkin. The following are extracts from the communication, which was published in full in the Society's "Journal" for the 30th of April.

With the attention of everyone turned to-day to the production of new fuels and the recovery of bye-products from coal and other sources for the use of internal-combustion engines or oil-fed boilers, peat as a raw product is naturally being considered. In Great Britain there are upwards of 6 million acres of peat bog with an average depth of 12 feet; in Ireland there are about 3 million acres, some of the bogs being very deep. Peat as dug contains large quantities of water—generally speaking from 80 to 90 per cent. In this condition, of course, it is of very little use; therefore it has to be, at any rate, partially dried. For the recovery of bye-products, it is usual to dry it down as far as 20 per cent. of moisture—that is, if peat coke is to be one of the products. Probably each acre would yield from 3000 to 3500 tons of such dried peat. Taking the lower figure, we arrive at the huge total of 1800 million tons of peat available in the United Kingdom; and in Ireland, where the average depth is greater, probably nearly as much again.

The great problem in dealing with peat, and the rock on which most of the older enterprises have split, is the removal of the moisture. If wet peat is subjected to hydraulic pressure, it is only possible to remove a comparatively small proportion of the water, owing to it being bound up in the cellular structure of the peat. A similar difficulty applies to drying by heat. Various methods have been used for breaking-down the cellular structure of peat, and thus obtaining it in a condition in which the moisture can be expelled, either by pressure or by air drying. Generally speaking, the latter has been found the most satisfactory; but it is a slow process, and is dependent to a large extent on atmospheric conditions. For the recovery of bye-products, peat must be treated in such a manner that the cellular structure is broken so that when pressed or moulded it will form a hard briquette. This may be done by means of macerating machines, a large number of which have been patented, and several give very satisfactory results. Even if peat is only intended for fuel, machine-made briquettes are far more efficient than when the peat is simply cut and dried. The calorific value is higher, and the briquettes burn away more slowly. In Holland, and also in Norway and Sweden, machine-made briquettes are largely used for domestic heating purposes.

Carbonization of Peat.

The oldest method of coking peat, and one which is still to a certain extent employed, is to coke it in heaps in the same manner as the old charcoal-burning process; all the bye-products being thus lost. The only satisfactory method, and the only one likely to be a commercial success, is to coke in some form of oven, and recover the bye-products. If, however, a firm, dense coke which will be of value in the metallurgical industry is to be obtained, it is necessary to produce briquettes formed from well macerated and dried peat before coking. If there is much moisture, then the coke formed will be too porous and friable. An alternative method is to coke moderately dried peat, which need not be briquetted, and to briquette the resulting coke in a manner somewhat similar to that employed in the patent fuel industry.

When peat is coked, various bye-products are obtained, the quantities and proportions of which depend upon the quality of the peat and the method of coking employed. A peat containing much mineral matter will give a coke which will not be of much value for metallurgical purposes; but this will not to any extent affect the bye-products. Peat which contains a high percentage of nitrogen will give a high yield of ammonia; but it will be necessary to carbonize at a moderately high temperature in order to obtain the maximum yield of ammonia. On the other hand, the character of the oils will be altered. Generally speaking, low-temperature carbonization seems to yield the most valuable oils; but there is no reason why the oils should not be driven off at a low temperature, and then, either by moving the partly carbonized peat to a hotter zone in the retort, or else by increasing the temperature of the whole retort, the maximum yield of ammonia should not also be obtained. The first would be a continuous process, and the second an intermittent one.

On carbonization of peat the following products are obtained: Gas, oils containing paraffin wax, phenols, ammonia, and small quantities of other bases, methyl alcohol and acetone, acetic acid, pitch, and coke. From the distillation of 576 tons of air-dried briquetted peat, containing 31 per cent. of moisture, at Oldenberg the following products were obtained per ton of peat. In order to make a comparison, I give the results obtained in my laboratory from a Scotch briquetted peat containing about 16 per cent. of moisture:

	Oldenberg. Pounds.		Perkin. Pounds.
Oils	54·0	..	50·0
Paraffin wax	6·0	..	not determined
Phenols	26·0	..	28·0
Methyl alcohol	6·8	..	5·1
Sulphate of ammonia	6·2	..	30·2
Acetate of lime	10·0	..	8·0
Pitch	4·0	..	3·5

The Oldenberg peat contained 0·7 per cent. of nitrogen, and the Scotch peat 2·1 per cent., which accounts for the difference in the yield of sulphate of ammonia. Other differences are readily accounted for when it is borne in mind that my results were obtained from the distillation of 5 kilos. of peat at a time, whereas the German results were from 576 tons, in quantities of several tons at a time.

The gas, having a good calorific value, can be burnt under the retorts, and should be sufficient to supply all the heat required when once the process has started. This is shown by the analyses of gases produced:

	Oldenberg.		Perkin.
Carbon monoxide	8·6	..	14·4
Methane	14·8	..	11·5
Unsaturated hydrocarbons	1·0	..	3·4
Hydrogen	23·6	..	19·0
Carbon dioxide	27·4	..	31·4
Nitrogen	22·5	..	19·9
Oxygen	2·2	..	0·4

The yield of gas is between 5000 and 6000 cubic feet per ton of fuel carbonized. The calorific value of the Scotch peat briquettes containing 16 per cent. of moisture was 8558 B.Th.U.; that of the coke produced 13,680 B.Th.U. The tar from which the oils are obtained by distillation is generally considerably contaminated with finely-divided carbon, which, on distillation, causes further carbonization. A rather brittle pitch is thus obtained if the whole of the oils are distilled off. If, however, live steam is injected towards the end of the distillation, a much better pitch is obtained, which can be used for insulating purposes.

The oils obtained in my laboratory consist mainly of saturated hydrocarbons. They have a peculiar burnt peaty odour, which, however, can be removed by treatment with about 1 per cent. of strong sulphuric acid. The lighter oils could be used for internal combustion engines. The heavier oils lack viscosity, so are not of much use for lubricating purposes. But they could be used as oil fuel, or might be cracked into light spirit and then employed for automobiles. The phenols, which are obtained in rather large quantities, contain, among other products, guaiacol. They have already been employed to make disinfectant bodies, and appear to form very good antiseptics.

The Peat Coke and Oil Syndicate, of Doncaster, carbonize peat containing from 50 to 60 per cent. of moisture. The peat is not briquetted previous to being carbonized; the briquetting operation being carried out with the peat coke obtained in the process. This is mixed with certain binding materials, some of which are

obtained from the peat bye-products. The briquettes are then pressed and coked again in the usual manner. From four lots of one ton each carbonized, the following bye-products were obtained:—

Water-free crude oils	8·8 gallons.
Ammonium sulphate	21·2 lbs.
Spirit—petrol	3·9 gallons.
,, —160° to 200°	3·5 ,,

Apparently the methyl alcohol and phenols had not been worked up. The paraffin was left in the pitch, which makes a good insulating material. The briquettes produced by this process are very hard, and have been well reported upon for steel smelting; the average crushing pressure being 812 lbs. per square inch. It is now proposed to erect plant capable of dealing with 100 tons of coke per week. Preliminary tests have shown that the bye-products alone more than cover the whole cost of the process, and that the sale of the coke is all profit.

Peat for Power Purposes.

Another method of working-up peat and producing bye-products is to employ it for the manufacture of power gas. In this respect some very interesting experiments have been made in Canada by the Department of Mines. In a modified Körting peat-gas producer, the best results seem to have been obtained when the peat contained from 25 to 30 per cent. of moisture. With larger quantities of moisture, there is great difficulty in eliminating the tar from the gas. It is stated, however, that peat gas power plant has a distinct advantage over one using bituminous coal. With coal, the accumulation of tar in the valves and cylinder is difficult to remove, and necessitates the shutting-down of the engine; whereas tar from peat is readily removed by injecting into the open end of the cylinder a mixture of oil-soap and water. This completely dissolves the tar, which is thrown out by the forward movement of the cylinder.

The Power Gas Corporation have also a special producer in which peat is employed. In this producer peat containing 50 per cent. of moisture can be satisfactorily employed. The Company have a special mechanical process for drying peat from 80 per cent. to 50 per cent. of moisture, which renders them independent of weather conditions. It is claimed that by this process the total cost of the peat is only 3s. per ton, including excavating, manufacturing, and drying. In all producer processes the peat is completely burnt up; there is thus no carbon as a bye-product. Larger quantities of ammonium sulphate are, however, obtained than by distillation in retorts. On the other hand, the tar obtained is less valuable. Given a peat containing a fair proportion of nitrogen, it is claimed that the yield of ammonium sulphate is more than sufficient to pay all working and depreciation costs, so that the power gas is obtained free of cost.

THE DETERMINATION OF CARBON MONOXIDE IN AIR AND GASES.

By Frank S. Sinnatt and B. J. Cramer, B.Sc.

Last month Mr. F. S. Sinnatt, the Lecturer on Gas and Fuel Analysis, School of Technology, University of Manchester (in conjunction with Mr. B. J. Cramer), read a paper before the Society of Public Analysts on the subject of the "Determination of Carbon Monoxide in Air." In sending a copy of the paper—reprinted from the "Analyst"—he says he feels that the process described by the authors may find considerable application, and may be of use to gas chemists and others who have to face the problem of the accurate determination of carbon monoxide in air or in waste gases from any source. In publishing the paper in the "Journal," we emphasize Mr. Sinnatt's surmise that "any process which will help to lead to the complete elimination of 'unburned gas' of any kind—especially of the extremely poisonous carbon monoxide—will meet with hearty support" in our pages.

The determination of small percentages of carbon monoxide in the air of rooms and in other gases is of interest from a technical point of view. There is a growing tendency on the part of the gas industry to increase the percentage of carbon monoxide in illuminating gas; producer gas is also being applied for heating purposes where formerly coal gas was used. As there appears to be no legal limit to the percentage of carbon monoxide which may be present in commercial gas, the risks of gas poisoning from escapes and from incomplete combustion of the gases in faulty burners are very much greater—especially when gases are under pressure.

The dangers of poisoning from carbon monoxide are well known; but few statements are available describing the influence of small percentages upon the general health of the workpeople who may be continually exposed to it. Hempel states that decided symptoms of gas poisoning are observed when air contains 0·05 per cent. of carbon monoxide. It is not, however, possible to determine this percentage by means of the ordinary gas apparatus.

The method described in this paper has been used for the estimation of carbon monoxide in the waste gases from gas-heated irons and the exhaust gases from a gas-engine.

An examination of the literature of the subject shows that little information of an accurate kind can be found as to the percentage of carbon monoxide in the gases issuing from gas-fires, gas-heated stoves, gas-irons, and exhaust gases, or in the air of rooms in which coal gas or producer gas is being burned. We believe a possible explanation of this may be found in the difficulties encountered in the estimation of the gas.

The most convenient reagent to use for the oxidation of carbon monoxide is iodine pentoxide (as described by Ditte in 1870), which reacts with the gas according to the following equation:

$$5CO + I_2O_5 = 5CO_2 + 2I.$$

This reaction is quantitative at about 70° C., and the most suitable temperature appears to be 140° to 160° C. As will be seen, the work in this paper confirms this view, since the whole of the analyses have been doubly checked against a second oxidizing agent—viz., copper oxide at a red heat. It is necessary to eliminate sulphur dioxide, sulphuretted hydrogen, and unsaturated hydrocarbons, as these also react with iodine pentoxide; but Fillunger (in 1903) and Kinnicutt and Sanford (in 1900) have shown that iodine pentoxide is not affected by saturated hydrocarbons.

There are practical difficulties in the utilization of the above reaction. The estimation of either the iodine liberated or the carbon dioxide evolved would serve as a measure of the carbon monoxide present in the gas. The estimation of the iodine has been carried out in various ways; but perhaps the most convenient is the method described by Kinnicutt and Sanford, in which the iodine is collected in a solution of potassium iodide, and then titrated with a dilute solution of sodium thiosulphate. These authors also stated that the method which depends upon the absorption of the carbon dioxide produced was unsatisfactory. The iodine pentoxide has to be heated, and pure air passed through it until the iodine has been volatilized and obtained in a form suitable for estimation. This requires considerable time, and causes inaccuracies. A single determination may take five to seven hours. Morgan and M'Worther (in 1907) confirmed the statements of Kinnicutt and Sanford, but removed the iodine from the gas and then absorbed the carbon dioxide evolved in barium hydroxide solution contained in a long washing-tube. The excess of barium hydroxide was determined by titration with oxalic acid. The same objections may be advanced against this method—viz., the time required in order to obtain perfect absorption of the carbon dioxide by the barium hydroxide solution, and the uncertainty arising from the action of dilute solutions of barium hydroxide on the glass during a long period; the prevention of contact with the air and the breath of the experimenter; and the difficulty of titrating the reaction liquid at the completion of an estimation. That this last objection is recognized is shown by the fact that M'Farlane and Gregory (in 1906) described a special washing apparatus which admits of the solution of barium hydroxide being exposed to the gas, and also allows of the actual titration being carried out without the liquid being transferred to a second vessel previous to being titrated.

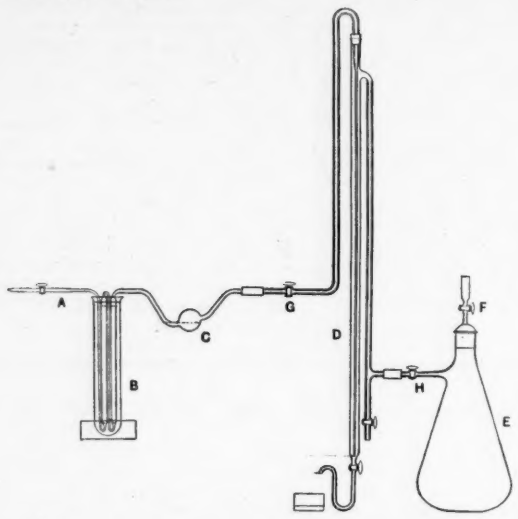
The method we have devised depends upon the collection of the whole of the carbon dioxide after the carbon monoxide has been oxidized with iodine pentoxide. The gas is obtained in a dry glass flask, which admits of the carbon dioxide present being determined by Pettenköfer's process. It is believed that the accuracy of this process will be attainable, which, according to Letts and Blake, is 0·04 part in 10,000.

The gas used in the experiments was prepared in the following manner: A measured volume of carbon monoxide (99·8 per cent. carbon monoxide by analysis) was mixed with air which had been freed from carbon dioxide. The mixture was then stored in a gasholder. The volume of the mixture prepared was about 80 litres. The whole of one set of analyses was carried out with this sample of gas. The gasholder was of the gasometer type; and the liquid in it remained unchanged. The gas was allowed to stand at least twenty-four hours before an experiment was commenced, so as to insure the liquid in the gasholder being saturated with the gas. The gas was passed through the following reagents contained in washing-bottles: Fuming sulphuric acid; aqueous caustic potash; concentrated sulphuric acid; and two long tubes containing solid caustic potash, in order to eliminate any carbon dioxide, unsaturated hydrocarbons, and moisture.

When carbon monoxide is estimated by determining the iodine liberated from iodine pentoxide, it is necessary to completely remove the moisture from the gas, since water (or water vapour) decomposes iodine pentoxide with liberation of iodine. In consequence, special precautions must be taken to dry the gas. Where

the carbon monoxide is being measured by the volume of carbon dioxide produced, the presence of moisture does not interfere with the accuracy of the process.

The gas was then passed into the tube A on the diagram. The main features of the apparatus can be gathered from the drawing; but since the various parts differ considerably from any previously described for the estimation of carbon monoxide, the following brief description is given.



The leading tube A was sealed to the wider tube, filled with alternate layers of iodine pentoxide and glass-wool throughout its length. As will be seen, the gas passes upwards through the iodine pentoxide in both tubes. The tube is placed in the glass vessel B, containing paraffin-wax, which was heated on a small sand bath. It was found that the bath could be kept constant within about 3° C. by regulating the height of the flame. This tube A was sealed to a small washing-tube or catch-bottle C, containing mercury, through which the gas had to travel. This eliminated the iodine from the gas previous to it entering the apparatus D. Former experimenters have used metallic aluminium, copper, or silver; but mercury was found to be more convenient and efficient. The apparatus D was described by one of us [in the "Analyst" in 1912] as a means for filling an evacuated vessel with gas at any desired rate. It was shown there that the vessel E could be made to act as an aspirator, and at the same time, by reading the level of the mercury in D, before and after the experiment, supplied the volume of gas which actually passed into E. As D contains mercury, and E is dried previous to an experiment, no loss of carbon dioxide can be possible.

The gas-vessel E was specially devised to admit of easy cleaning and drying, and rapid introduction of the barium hydroxide solution. The bore of the tap was made large enough to allow the end of a burette, which had been drawn out, to be passed through it. The barium hydroxide solution could be titrated without opening the flask; the liquid being titrated through the bore of the tap F.

A determination was carried out in the following manner: The capacity of the gas-vessel E and of the apparatus D was ascertained. The vessel E was dried and connected to D. The two vessels were then swept out with air from which the carbon dioxide had been removed. The taps F and G were then closed, and the apparatus and flask evacuated by means of a water-pump. Mercury was allowed to enter the main tube of D, and the height of the mercury column was read off accurately. The volume of gas-space available in the gas-flask could now be calculated. The iodine pentoxide tube is heated to the required temperature and connected to the train of washing bottles [not shown]. The gas to be analyzed was aspirated through the iodine pentoxide tube and mercury washing bottle until both were filled with either the gas to be analyzed or the oxidation products. This is only necessary at the beginning of a set of determinations. The evacuated flask and apparatus were then connected to the mercury washing-vessel C. Mercury was permitted to flow from the tube of D at a suitable rate. As shown by one of us [in the "Analyst" above referred to] the flow of gas through the train of apparatus into the iodine pentoxide tube can be set at any rate by the speed at which mercury is allowed to pass from the tube. About 1 litre per hour is an average rate.

A glance at the results of the experiments will show that various rates of flow have been used. The experiment may be left without supervision until the whole of the mercury has run from the burette. It was found to be more convenient to stop the experiment and read the level of the mercury a second time after adjusting the pressure for the liquid in the washing bottles. By this means the volume of gas which has passed into the gas-vessel may be calculated; and a certain diminished pressure still remains in the gas-vessel. The tap H of the gas-flask is now closed, and the flask disconnected from D. A measured excess of standard barium hydroxide solution is run into the small cup on the flask, and allowed to enter the flask as rapidly as possible. No gas is displaced. This eliminates one of the sources of error in the determination of carbon dioxide in the gas in the gas-flask. The pressure in the flask is brought to that of the atmosphere by allowing air free from carbon dioxide to enter. After being allowed to stand, with occasional agitation, the excess of barium hydroxide is determined by titration with N/20 hydrochloric acid.

Gas.	Potash Bulbs: Oxidizing Agent Hot Copper Oxide.		Absorbing the CO_2 formed in Barium Hydroxide, followed by Titration with Hydrochloric Acid.					
			Oxidizing Agent Iodine Pentoxide.			Oxidizing Agent Copper Oxide.		
	Vol. Gas, C.C.	CO per Cent.	Time, Hours.	Vol. Gas, C.C.	CO per Cent.	Time, Hours.	Vol Gas, C.C.	CO per Cent.
A.	1882	2·20	3	1959	2·07	3	1959	2·07
	941	2·03	3	2050	1·91	2¼	1779	2·08
	941	2 08	4	1779	2·08	35 mins.	2210	2·17
			2½	1668	2·15	28 ,,	2050	1·90
B.	1902	0·709						
	2872	0·670						
	Carbon Monoxide measured by Iodine liberated frcm Iodine Pentoxide.							
	Time, Hours.	Vol. Gas, C.C.	CO per Cent.					
	4½	548·0	0·673	5	2268	0·700	1¾	2240	0·682
	6	1017·0	0·679	5	2062	0·650	2	2085	0·676
	5	507·5	0·652	6	2202	0·689	—	—	—
C.	5	2373·0	0·039	3	2228	0·040	2½	2144	0·042
	3¾	2467·0	0·039	4	2201	0·042	3	2227	0·040
	4	2455·0	0·041	4	2253	0·040	1¾	2226	0·041
	5	2431 0	0·041	—	—	—	—	—	—
D.	4½	2425·0	0·025	4	2182	0·025	4½	2201	0·024
	5	2320·0	0·025	3¼	2163	0·026	4	2213	0·025
	6½	2436·0	0·023	—	—	—	—	—	—

The volume of carbon dioxide found in the gas-flask is a direct measure of the carbon monoxide in the same volume of the gas.

One of us has shown already [see "Analyst" for 1913] that this principle can be used for the estimation of carbon dioxide in carbonates, and the extension of the process would point to the method being of use for the estimation of even smaller amounts of carbonates than were attempted in that paper.

Since the gas analyzed in these experiments was known to contain only carbon monoxide—no other gas which was oxidizable could be present—it was thought that it would be of interest to repeat the experiments with a second oxidizing agent, such as copper oxide. The series of figures show that the oxidation with iodine pentoxide under the conditions described in this paper is as complete as when red-hot copper oxide is used. Further, for many technical purposes, copper oxide will find applications where it would be inconvenient to use iodine pentoxide.

The copper oxide was placed in a combustion-tube, and the length of the layer used was about 9 inches. Both Jena glass and silica tubes were tried. The tube was heated in a small furnace to a red heat (750° C.). The tube was connected to the train of washing-bottles, and then to the apparatus D. The determination was carried out in exactly the same manner as when using iodine pentoxide. It was found that, for gas containing 2 per cent. of carbon monoxide, the oxidation of 2 litres could be completed in about thirty minutes. The carbon monoxide present in each sample of gas experimented upon was determined where possible by combustion over red-hot copper oxide, and absorption of the carbon dioxide in weighed potash bulbs. Below a certain dilution, this method is impracticable. The method described by Kinnicutt and Sanford was also used. In all, about 100 samples of gas were analyzed, of which the typical concentrations are given in the table.

A number of experiments were carried out on Gas "A," taking a shorter time than thirty minutes; but the results were all low. It was not possible to check the percentage of carbon monoxide in Gas "C" by means of potash bulbs; the amount present being too small to yield accurate results.

We wish to emphasize certain features of the method described above. Although the apparatus may appear somewhat complicated, it is actually simpler than that necessary for the aspiration and measurement of a large volume of gas with any degree of accuracy. The actual measurement of the volume of the gas is not interfered with by any of the constituents being soluble in the containing liquid. The method is extremely easy to carry out, and a number of workers have tried the process and found no difficulty in the manipulation. The experiments require little attention during the actual passage of the gas. This will be recognized as of importance when the time necessary for carbon monoxide and iodine pentoxide to react quantitatively is considered. When one experiment is complete, another may be at once commenced by simply attaching a fresh gas-flask which has been evacuated in the meantime. Any desired volume of gas may be taken in the same flask; all that is necessary is to leave the contents under a lower pressure.

The method is being applied by one of us to the determination of small percentages of methane in air.

MIDLAND JUNIOR GAS ASSOCIATION

At the South Metropolitan Gas-Works.

Early on Saturday morning, a party of members of the Association arrived in London to participate in a visit which had been arranged to two of the works of the South Metropolitan Gas Company. Unfortunately, the muster was hardly in proportion to the numerical strength of the Association; but this was in large measure due to the fact that a good many who would otherwise have been present had the previous day gone to Leicester to attend the Midland Conference of the British Commercial Gas Association, at which Mr. R. J. Rogers (a member of the Midland Junior Association) read a paper. However, those who did come—and there were about twenty-five of them, including the President (Mr. W. H. Johns, of West Bromwich), the Hon. Secretary (Mr. W. J. Pickering), and Dr. W. B. Davidson (of Nechells)—had an exceedingly good time. The one thing that was keenly regretted by all was that Mr. F. J. Bywater, the Engineer of the East Greenwich works, and the first President of the Association, was prevented by indisposition from welcoming his old friends in his new sphere.

A full day's programme had been arranged; and it opened immediately after lunch, when the party proceeded to the Old Kent Road works, where they were received by Mr. W. Doig Gibb (the Chief Engineer), who expressed his regret that another engagement prevented him from accompanying them on their round of visits. On behalf of the Chairman (Mr. Charles Carpenter, D.Sc.) and himself, he wished them an enjoyable and instructive afternoon. They were then handed over to the care of Mr. A. Stokes (Chief Outdoor Inspector of the Company), Mr. T. S. F. Gibson (who is in charge of the station), Mr. D. Chandler, and members of the staff, who conducted them first of all through the show-room, the contents of which excited general admiration—particularly the "Metro" silent gas-fires. Many of the handsome fittings displayed, too, won great favour. The meter testing and repair shops were inspected; and the arrangements for the testing and standardization of lighting appliances were explained. The members made close acquaintance with the "Metro" burner; and subsequently, in the stove shops, they were introduced to the "Metro" cooker—the only pattern which has been purchased by the Company for the past ten years. There was not much time to spare here; but some part of the little that was available was spent in examining the apparatus for plating cooker tins and other utensils. A walk through the extensive stores, which contain everything required for cooking, heating, and lighting, afforded the members some idea of the magnitude of this part of the operations of the Company, whose distribution work is carried on over a district of about 56 square miles. All too soon, the moment arrived to say "good-bye;" and this was done, after a hearty vote of thanks to Mr. Stokes, Mr. Gibson, and the other gentlemen who acted as guides, had been passed on the proposition of the President.

The visitors then betook themselves to the East Greenwich works, where the remainder of the afternoon was to be spent. On arrival, they were met in the Men's Institute by Mr. R. H. Collins (the Assistant Engineer), who told them how sorry he was that Mr. Bywater was not able to be present. It had been arranged that here the members should be divided into two groups, one of which would inspect the tar works and the chemical works, and the other the chemical works and the gas-works. Those who chose the former route were first started off. The band was a very small one; but its lack of numbers was amply compensated for by the thirst for information which was displayed—and which the Manager (Mr. S. S. Field) and Mr. F. A. Frost neglected no opportunity of satisfying. Indeed, from the point of view of the chemist, the works are full of interesting features. Ordnance Wharf, the site of the tar works, is separated only by a roadway from the gas-works, and, with an area of about 7½ acres, has a frontage to the river of 800 feet. The whole of the Company's make of 11 million gallons of tar is distilled there, in three continuous tar stills, the combined capacity of which is 53,000 gallons per 24 hours. The method is to vaporize the oils in the tar, and to successively cool these at determined temperatures, thus obtaining oils of different boiling-points. The oils are then separately treated to secure the final products—benzol, toluol, solvent naphtha, pyridine, carbolic acid, cresylic acid, naphthalene, creosote, tar oils, anthracene, and pitch. The pitch is run off into large bays; and when it has cooled it is broken out and placed in skips. These skips are then conveyed to the vessels by means of Temperley transporters running upon an elevated track over the whole length of the bays. The trade in prepared tar for road construction already amounts to 400,000 gallons per annum.

The second party (who had now been joined by Mr. S. A. Carpenter, the President, and Mr. Ernest Scears, the Hon. Secretary, of the London and Southern District Junior Gas Association) began their round of inspection at the chemical works, where they were under the care of the Manager (Mr. F. Shadbolt). These works—which have an area of about 3 acres, and consist of a sulphuric acid and sulphate of ammonia plant—deal with the oxide of iron made at all the stations of the Company, and with practically the whole of the ammoniacal liquor. The liquor is brought in barges from the other works, and pumped into liquor wells, from which it passes to measuring tanks. The sulphate of ammonia plant consists of three units, each capable of dealing with about 62,000 gallons of 8 oz. liquor per day. The stills, it may be remarked, were designed by Mr. Charles Carpenter. The sulphate is passed through centrifugal dryers to an elevator which runs along the top of the store, into which the sulphate is dropped. On Saturday, the visitors were fortunate in being able to see the work of bagging sulphate being carried on. This is done in a building in which are fitted a number of hoppers into which the sulphate is taken by elevator from the store. Round each hopper was gathered a group of men engaged in filling, weighing, and sewing the bags. When ready, the bags are placed on an endless band-conveyor, which runs along the floor in the centre of the room, and taken to the riverside—in fact, to a spot whence they slide down right into the waiting barge. While travelling on the conveyor, the weights of the bags are automatically recorded and checked. Everything was working with the utmost smoothness. It was gathered that in the two days, Friday and Saturday, some 400 tons of sulphate had been dealt with in this way. As to the acid plant, this consists of four units dealing with 30 tons of spent oxide, equal to 65 tons of 70 per cent. acid, per day. Attached to this portion of the works, is an acid concentrating plant on the Kessler system, for concentrating chamber acid up to 1·840 sp. gr. for commercial purposes.

The visit to the gas-works was made under the guidance of Mr. Collins, Mr. G. Cox (the Retort-House Superintendent), and Mr. H. Holt. The first point visited was the jetty, which extends about 75 yards into the river, and where vessels up to 6000 tons can be unloaded by four hydraulic cranes, with self-acting grabs, capable of dealing with 200 to 250 tons of coal per hour. As a matter of fact, a ship of nearly 4000 tons was just then being unloaded. In addition to the requirements at East Greenwich, coal is unloaded from colliers here and taken in barges to other stations. The Company own three tugs, which are very well known on the river. From the storage-hoppers on the jetty the coal is taken by locomotives over an overhead gantry into the five retort-houses (where there are stores capable of holding 36,000 tons under cover), or to the storage ground adjoining (where about 300,000 tons can be placed). The total manufacturing capacity of the works is 26 million cubic feet per day; and the houses—each of which is 485 feet long and 71 feet wide—are equipped with horizontal retorts. Hydraulic stoking machinery is used—Arrol-Foulis chargers, and Hunter-Barnett dischargers. The visitors were taken into one of the houses at the time when charging was in progress, so that they had an opportunity of seeing the machinery at work. The coke is removed from the houses by locomotives on a low-level railway. A point about the working at East Greenwich is that the gas from each retort-house can be kept entirely separate throughout the whole of its progress through the various items of plant into the holders, or the streams can be united and worked in combination. Seeing that the area of the East Greenwich works is about 150 acres, it will be understood that the members could not inspect everything; but each one was handed a description of the plant, which set forth concisely the salient features of the place. Attention was drawn to the 12 million cubic feet gasholder; and there was also an opportunity of noting the excellent mess and lavatory accommodation provided on the works. The East Greenwich district, of course, does not require all the gas that is made there; and the surplus is pumped by centrifugal fans to the Old Kent Road gasholders through about 4 miles of 48-inch main. Similar fans are in use for increasing the gas pressure to Woolwich and the adjoining districts. The use of these fans, it was pointed out, renders the working pressures quite independent of those thrown by the gasholders, which, in the case of large ones, are insufficient for present-day requirements.

The last item of the visit had been much looked forward to; and for this the party were taken in hand by the Company's Chief Chemist, Mr. E. V. Evans, who was assisted in his explanations by Mr. J. Hewett. The plant referred to, of course, is that for carrrying out the Evans nickel catalytic process for the elimination of the sulphur compounds, which was described by Mr. Carpenter in a paper he read before the Société Technique du Gas en France last June. The installation at East Greenwich is a 15 million cubic feet per day plant, in five units of 3 million feet each—one unit being always under aëration. The plant is getting into its full working stride; and is actually dealing with 12 million feet a day; while an installation for a further 12 million feet is in course of construction. It is housed in a building having a steel framework filled in on the "Hy-Rib" method of construction—that is, with specially formed metal covered with a mixture of two of sand to one of cement, 2 inches thick on the outside, and ½ inch on the inside. Coke is brought to a pit outside the house, and a telpher system is used for conveying it to the hoppers in the house for use; the skip being filled, raised, and emptied by the operation of suitable levers at the end of the house. The telpher, which is operated by a gas-engine, has been so arranged that it can also be used for the second installation when ready. There are five producers, one for each unit; the unit being split in two halves, and the producer being in between. The temperatures are recorded by means of Leskole pyrometers, which are so arranged that from one switchboard the temperature of any unit can be easily seen. Samples of gas at the inlet and from the outlets of each unit are passed to the laboratory attached to the plant, where the sulphur content is estimated—strict watch being kept on the working of the plant in this way. One of the most important features of the plant is that the incoming

gas is raised to a temperature very nearly that of the reaction material, by means of heat interchanging devices; the incoming cold gas passing in a reverse direction to the outgoing hot gas—thus effecting the desired transfer of heat. This, it is pointed out, has a great bearing on economy in the use of fuel. A small fan and gas-engine have been installed for the purpose of blowing in the air necessary for the purification of the material; and in this way the quantity of air introduced can be kept absolutely under control.

The inspection of the works completed, the visitors were again taken to the Institute, where they had an opportunity of admiring all the attractive features therein contained for the benefit of those employed on the works. Here are a stage, a dancing floor, billiard tables, rooms for cards, &c., and a full-length miniature rifle range. All this is at the disposal of the men in return for a small weekly subscription. In the main hall, high tea was served, and proved very welcome after the busy afternoon. Before the members separated, to spend the remainder of their time in London as best suited their individual inclinations,

The PRESIDENT said they had spent an enjoyable and instructive afternoon; and their thanks were due to all those who had so ably acted the part of guides. Everything possible had been done to ensure that when the visitors left the Company's works they should know more than when they arrived there. Personally, he had learnt a good deal. They must also thank the Chairman and the Chief Engineer for permitting the visit. To all these gentlemen he proposed a hearty vote of thanks. The only thing they were sorry for was the absence of Mr. Bywater, to whose efforts was so largely due the great success that the Association had achieved. As the first President, he did splendid work. The least they could do was to ask the Hon. Secretary to write to Mr. Bywater, in the name of the Association, expressing their regret at his absence. He gathered that they were the first Association to enjoy the privilege of inspecting the new sulphur purification plant at East Greenwich; and this was a fact on which they ought to congratulate themselves.

The HON. SECRETARY seconded the vote; remarking that he had been much struck with the cleanliness and orderliness observable everywhere, and with the spirit of cordiality that must exist between the staff and the men for things to have such a splendid appearance.

Mr. COLLINS responding (after the vote had been carried by applause), said Mr. Field was the proper person to thank them for their kind vote. They had all been very pleased to see the visitors. Personally, this was the first time he had met members of the Midland Junior Association; but he hoped it would not be the last. He trusted they had enjoyed themselves. He had had a telegram from Mr. Bywater, saying: "Please offer for me hearty welcome to the President and members of the Midland Junior Gas Association. Much regret inability to be with you." This regret they all knew was a very sincere one.

The PRESIDENT announced that he had also received a telegram from Mr. W. Wastell (late of Birmingham, and now the Secretary of the South Suburban Gas Company) saying he was sorry not to be able to join the party.

MANCHESTER JUNIOR GAS ASSOCIATION.

Visit to the Great Harwood Gas and Water Works.

There was a very fair attendance of the members of the Manchester and District Junior Gas Association on Saturday, when a visit was paid to the Great Harwood works of the Accrington Gas and Water Board, on the invitation of the Gas Committee and Mr. Charles Harrison, the Engineer and Manager. The party, which included the President (Mr. J. M'Nicholl, of Warrington); the retiring President (Mr. W. L. Heald, of Preston); the Junior Vice-President (Mr. S. Carter, of Garston), and one or two members of the Manchester District Institution of Gas Engineers, were welcomed at Accrington Station by Mr. E. INGRAM, the Manager of the Great Harwood works, who had provided for the use of his colleagues a motor *char-à-banc*, in which the party enjoyed an exhilarating drive through Clayton-le-Moors to Great Harwood. Mr. Ingram then piloted the party through the works.

DESCRIPTION OF THE WORKS.

The area of the Accrington District Gas and Water Board covers the following townships: Accrington, Church, Clayton-le-Moors, Rishton, and Great Harwood, each of which sends a representative to the Board. The undertakings include three waterworks and two gas-works, for the supply of water and gas in the Board's large area.

The Great Harwood Gas-Works are situated three miles from Accrington, on the loop line from Blackburn to Burnley. They have access to the railway sidings, enabling waggons to be brought direct into the works. The only drawback is that horse traction has to be used; the rails crossing one of the main roads.

THE POWER-HOUSE.

The first object of interest is the power-house, where are installed two generating sets of equal capacity. The dynamos are of the Siemens direct-current slow-speed type, and are each of 50 kilowatts capacity. They are driven by two Crossley gas-engines of 80 H.P., and drive direct through flexible couplings at a speed of 210 revolutions per minute. As a rule, one engine and generator are found ample for all the plant running at one time.

COAL-HANDLING PLANT.

The coal-handling plant is electrically-driven throughout. Two tipping-rams are used to empty the waggons, each driven by a 6 H.P. motor through suitable gear; the whole operation of emptying a waggon taking from three to four minutes. The coal-crusher and elevator has a capacity of 30 tons per hour, and is driven by a 16½ H.P. motor.

The crusher is of the tray-fed type, and it works very satisfactorily, giving a constant feed to the elevator. The coal is fed on to two conveyors by an arrangement of slides, and it can be diverted from one to the other.

The plate conveyor for feeding the bunkers is upwards of 200 feet long, and is driven midway of its length by a 12½ H.P. motor. In diverting the coal, it falls on to a cross-band conveyor 18 inches wide; this again feeding on to a band 200 feet long over the centre of the coal-stores. The belt has a suitable carriage to throw off coal at any point. In addition to this, there has been fixed an elevator and cross band conveyor in the centre of the coal-sheds, for the purpose of feeding coal from the stack to the plate conveyor, and thence into the bunkers. This has proved very useful, enabling the Manager to get coal to the machine when troubled with breakdowns to the crusher motor.

RETORT-HOUSE PLANT.

The stoking-machine is of the well-known Fiddes-Aldridge type, and has worked exceedingly well since it was installed. At present it is operating 20 feet through retorts; but it is designed to charge retorts 22 feet long when the old bench is converted. The bunkers overhead have a storage capacity of 200 tons. The coke is taken direct from the front of the retorts by one of Dempster's type of rake conveyors, driven by a 6¾ H.P. motor. The coke from this conveyor falls into another, driven by a 10 H.P. gas-engine, which conveys it into the coke-pits, where it is screened. The handling of it here is done by a steam crane running on an overhead gantry. The coke can be put into stock to a height of nearly 40 feet, or loaded direct into waggons.

The retort-house is 230 feet long, with open coal-stores on each side; and it has a total storage capacity of 3500 tons. The old section is fitted with 18 beds of seven stop-end retorts, back to back, of the Valon type, very few of which are at work in this country. The most noticeable feature is the furnace. There are no fire-bars, but simply an opening, 14 in. by 8 in., for the purpose of cleaning and draught. But good heats have always been obtained.

These settings are now being dismantled for reconstruction with beds of six 22 feet through retorts, fired on one side. The whole stack will be dealt with as required. The new section is fitted with eight beds of eight retorts, 22½ in. by 16½ in., fired on both sides; but they will be converted to single-fired settings as convenient, to suit the new conditions of machine charging.

CONDENSING AND OTHER PLANT.

The rest of the plant is nearly all in duplicate. The two sets of condensers are of the annular type, and the larger set is ample for cooling the gas in the heaviest day's make. The two tower scrubbers are 70 and 40 feet high respectively. One is filled with ½-inch boards, and the other with blast-oven coke. The smaller tower is fitted with a tar extractor, which is a very efficient piece of apparatus.

The purifiers are also in duplicate—one set of four boxes 16 feet square, and the other of four boxes 30 ft. by 20 ft.—working in rotation, three on and one off. The usual method is to divide the gas into two streams, and send it through two catch-boxes, one of oxide and the other of lime; but with the arrangement of connections it is possible to work through eight boxes in rotation if required.

The exhausters are also in duplicate. One is a four-blade Waller's of 80,000 cubic feet per hour capacity; the other is also a Waller's, but of the three-blade type, of 60,000 cubic feet per hour. The smaller one deals easily with the heaviest day's make.

Among other portions of the plant is a "Simplex" carburettor. Though this is not in operation at present, it proved itself very useful for enrichment and the prevention of naphthalene. The two holders have a storage capacity of 1,500,000 cubic feet, and are well above 24 hours' heaviest consumption. The sulphate plant was erected three years ago by Messrs. Dempster, and has worked very well. It has a capacity of 3 tons per day.

THE VISITORS' APPRECIATION.

So interested were the visitors in everything that Mr. Ingram and his assistants had to show them at the different stations that more than three hours were spent in the works. Tea was afterwards partaken of at the Palatine Rooms, Great Harwood. At the close of the repast,

The PRESIDENT said he was sure the members would all agree that they were very much indebted to the Accrington Gas and Water Board for the facilities they had afforded them; and particularly to Mr. Ingram, for the hearty manner in which he had carried out all the arrangements.

Mr. W. L. HEALD (Preston) said it gave him good deal of pleasure to propose that the best thanks of the Association should be accorded to Mr. Ingram, not only for showing the members round the works with so much care, but also for his hospitality. When he (Mr. Heald) approached Mr. Ingham, some fifteen or sixteen months ago, to allow the members to visit the Great Harwood works of the Accrington Gas and Water Board, he rather jumped at the idea; and, with the kindly interest of his chief (Mr. Charles Harrison), he had had no difficulty in making the arrangements which had been so well carried out. At the Harwood Gas-Works they had had an opportunity of inspecting an installation of machinery as up-to-date as any they had ever had the pleasure of looking at. If Mr. Ingram had troubles—and most of them

had with new machinery—he would only have them for a very short time. He believed the plant was only started in November last, so one could hardly expect the men to know in that time all the tricks that the motors and conveyor-bars would play. They heartily congratulated both Mr. Harrison and Mr. Ingram, not only on the design of the works, but on having brought them to such a state of completion. Speaking as a mechanically minded man, he was greatly impressed with the way in which the plant was duplicated, and the manner in which they had seen it running.

Mr. A. HODGSON (Hurst) seconded the proposition. He said he cordially re-echoed the sentiments to which Mr. Heald had given utterance. To him (the speaker) the visit had been a real treat from every point of view. There was no doubt as to the value which attached to their gatherings from the educational point of view. The Great Harwood works reflected the highest possible credit on Mr. Ingram, who had that afternoon gone into the minutest detail of the whole of the plant; and everyone who had the privilege of his guidance must have benefited by it.

The motion having been carried by acclamation,

Mr. INGRAM, who was again cordially received on rising to respond, said that if he had been able to afford his colleagues any pleasure, he had also given it to himself. Speaking of the new plant at the gas-works, he confessed that he had certainly had a lot of trouble; but this was only what could be expected when everything was new. As Mr. Heald had rightly said, it took time to find out the little faults. They were working better now than they were three months ago. The men were becoming more accustomed to handling the plant; but it would be several months before it was completed throughout. He hoped that at some future time the members of the Association would be able to include in their syllabus another visit to the Great Harwood works; and on that occasion they might also include the Whalley works.

MECHANICAL ENGINEERING PRACTICES IN GAS-WORKS.

Mr. J. EDMONDSON (of the Bradford Road station of the Manchester Corporation) then read a paper on the above subject. It will be found, together with some of the remarks upon it and the author's replies to questions put to him, on this and succeeding pages.

At the conclusion of the reading of the paper,

Mr. EDMONDSON said he desired to express his indebtedness to Mr. J. G. Newbigging, M.Inst.C.E., the Chief Gas Engineer to the Manchester Corporation, and President of the Manchester Institution of Gas Engineers, as well as to Mr. J. R. Hill, who has charge of the Bradford Road station, for their kindly interest in his paper, by placing at his disposal certain of the necessary data required. He also desired to thank Mr. A. L. Holton, the Works Superintendent at the station, for the assistance rendered to him in arranging the paper.

On the proposition of Mr. R. BOWDEN (Stockport), seconded by Mr. E. W. MORRISON (Sheffield), a hearty vote of thanks was accorded to Mr. Edmondson; regret being expressed by both members that the lateness of the hour precluded a longer discussion.

Mr. EDMONDSON returned thanks.

MECHANICAL ENGINEERING IN GAS-WORKS.

By J. EDMONDSON, of Manchester.

[A Paper read before the Manchester and District Junior Gas Association.]

Mechanical engineering is now an important factor in all medium or large gas-works, owing to the extensive use of labour-saving machinery; while even in the case of smaller works, where an exhauster and one or two small pumps are in use, the services of a mechanic are often necessary. A knowledge of mechanical engineering practice is, therefore, of value to the one handy man employed on a small works, and increasingly so to those responsible for the maintenance of the machinery of the large works. If labour-saving appliances are to be worthy of the name, it is essential that every attention should be given to maintain their full efficiency, and to prevent breakdowns, as, owing to the important work they are called upon to do, much of the success of operations evolved is dependent on their being kept in action. The repairs and alterations to coal and coke handling plant, loading and unloading appliances, and to carburetted water-gas machinery entail a large amount of work for the mechanical engineer, and a staff of workmen necessary to carry out such work as can be economically executed in the various workshops.

My own experience covers a connection with works varying in capacity from 500,000 to 18,000,000 cubic feet per 24 hours. The latter provide work for extensive shops; and I purpose making the subject-matter of my paper a description of some of the practices and methods we have in use at the Bradford Road works of the Manchester Corporation. Many of the members have visited the works, and will no doubt have some knowledge of their capacity, methods of dealing with material, and the various processes carried on. It will therefore be unnecessary for me to give any details of the machinery used, except as may be required in dealing with any particular portion from time to time. What I hope to do is to give a general idea of the methods of carrying out the work of repairs and maintenance, and to show how in some cases improvements have been effected and wear and tear minimized by thoughtful consideration given to some of the details connected therewith.

COSTING.

It is important in connection with the upkeep of plant and machinery to know what costs are involved; and the information gained by adopting some system of costing will be useful in many ways. It will act as a preventive of waste of time on the workman's part, when he knows that the result of his work is being recorded, and that it may be used for making comparisons with jobs of the same character, or with work covering periods of time of (say) three, six, or twelve months. It also serves to stimulate those in charge in devising the best means of carrying out the various jobs that have to be taken in hand, and so avoids unnecessary labour being expended on them. Further, it enables a comparison to be made between the cost of making the parts of machines or plant on the works or buying elsewhere.

In order to obtain the best results, a systematic method should be adopted in carrying on the work, in order that all sections may be kept fully and usefully employed and have sufficient jobs in hand, so that the workman may have no excuse for nursing any job while another is found for him. To facilitate this, it is necessary, even in repairing shops, to provide such working drawings of the parts to be made that full information may be given to the various tradesmen as to what is required of them, and not leave it to each one to carry out the work as he thinks it should be done. The drawings for such purposes, it should be remembered, are not always handled carefully in the workshops; and all that is needed in this respect is that they should be plain, but with every detail shown. In numerous cases a sheet of foolscap will serve the purpose, with a freehand sketch on it; and as this size of sheet is in common use, it lends itself to filing away for future use. Some of you may think that all this is unnecessary for many of the jobs dealt with on a gas-works; but I can assure you that many disappointments and much valuable time may be saved when definite information is given for any work that has to be done.

Another aid to good results is that, in the making of patterns or forgings, due regard should be made to the allowance for machinery, so that the minimum amount of labour will be entailed in making the finished article. This is important, as all surplus metal has to be bought, and all time spent on it is a waste.

STOREKEEPING, &c.

At this point, I purpose to outline briefly our system of storekeeping and preparation of work for the shops and stores, as well as the methods used to arrive at the cost, so far as it concerns the work generally.

In the first place, for stores purposes we make a division of the machinery used on the works into suitable units; and by giving each of these units a distinguishing letter, we are able to simplify the storing of drawings and the locating of stock. To illustrate more clearly what is meant by the divisions, I will give one or two examples. All patterns or forgings required for charging machines have the letter A given them; while for air compressors the letter is B, for drawing machines C, for machinery connected with purification F, and so on. When a pattern is made for any section of the works, a description is entered into a loose-leaf book, with the necessary alphabetical divisions. In addition to the description, a pattern-store number, together with a record number, is entered, one of which may be as follows: "No. 1. Scrubber-Engine. Crankshaft Step, F 4—20." With this information, it is not difficult to find out by a reference to the record book whether the pattern for this particular part is made. If it exists, it is easy to locate its position in the stores, as F 4 is the shelf on which it is kept; the finished pattern having the number given above stamped on it.

This applies also to the stores for rough and finished material, each part being identified by the distinguishing marks given to the pattern. Forgings are treated in a similar manner; but since no patterns are required, the letter X is substituted for the pattern-store number, and the record reads thus: "No. 1. Scrubber-Engine. Slide-Valve Spindle, F X 24." The addition of the X is the symbol for forging.

Workshop stores received and issued are dealt with as follows: For all material required a requisition form is filled up by the foreman and sent on to the office, where the order is dealt with. The requisition is then returned to the stores, filled in with particulars as to where the goods are ordered from. The receipts are entered in a book kept for the purpose, making a carbon copy; and these are sent to the general office, where records of stocks are kept. Issues are made to a foreman's order, and daily returns made in the same way as receipts.

DEALING WITH WORK FOR COSTING.

In the making of spare parts in large or small quantities we use a works order, to which all time and material is charged. This is made out on a special form, and has the letter E, in addition to its number—this letter denoting all jobs that are transferred to stores on completion. These are received in the same way as ordinary stock; and the order is then passed on to the office, where the cost is worked out. Spare parts thus made are issued in the usual way. For ordinary repairs to machinery, a slightly different form of order is used, to which the letter G, together with a number, is attached. To these all work done and materials used is charged. Such orders remain in use for twelve months, or longer periods, as thought fit, and are issued to cover the various sections of the works, or for groups of machines, and in some cases single machines. One instance of this may be as follows: "No. 3. Steam Loco Crane. Works Order, G 10." Special works orders are also used for overhauling machines and alterations, and for preparations required in the installation of new

plant and machinery. All jobs coming within the above class are given progressive numbers, and when completed are returned to the office, where the cost of the work is recorded.

The following figures represent the cost of repairs to machinery, most of which has been in constant use during the last 18 to 25 years; this, of course, making the repairs heavier than during the earlier years of its existence.

Coal Gas.	Cost of Repairs per Ton of Coal Carbonized.
West's compressed air charging and drawing machines and air-compressors	1·055d.
Coal-breakers, elevators, and conveyors, locomotive and tipping crane for the handling of coal from sidings to breakers and stores	0·410
Exhausters, rotary scrubbers and engines, purifiers, elevators, engines, and cranes	0·340
Total	1·805d.

Carburetted Water Gas.	Cost of Repairs per 1000 Cubic Feet Gas Made.
All machinery, including oil, water, tar, and circulating pumps, exhausters and engines, fans and steam turbines, hydraulic lifts for coke, &c., purifiers, elevators, engines, and cranes	0·071d.
Total	0·071d.

Workshop Methods.

Instead of giving a description of the tools usually found in a well-arranged engineering repair shop, I purpose now to offer a few particulars as to some of the methods that I have found to be advantageous in carrying on work in the shops. One of the most useful appliances used in connection with machine tools is the internal and external cylindrical gauge for the measurement of standard sizes when making interchangeable parts. This is extremely useful for lathe work, or for many other jobs where accurate dimensions are needed.

For work that has to be repeated from time to time, templates and gauges of suitable kinds should be made, to standardize the parts. A simple example of one may be taken, in setting out the bolt-holes of pipe-flanges. Templates for these made from cardboard are inexpensive; but the time saved by their use may be considerable, as is well known to anyone having carried out work of this kind. A further example is found in the construction of side tipping waggons used in the retort-house for the removal of coke. The material used for these are flat and angle steel sections. All the parts are drilled to template, and where necessary bent to blocks of suitable shape. In this manner, the work is simplified; and being made in quantities ready for assembling, considerable time is saved over the method usually adopted in a repair shop of making each part separately, then marking the holes, after which it is fixed in position. Another piece of work somewhat different from the last-named is the setting-out of crossings for railway sidings. By the aid of templates correctly set out any renewals can be executed without any disturbance of those in use, until the whole is fixed up ready for placing in position.

Among the tools used in the engineering shop deserving special note are the high-speed twist drills. The price of these is much more than the ordinary carbon steel drills; but the amount of work that can be turned out by them justifies their use in the shop. The selection is made according to the work for which they may be most suitable. The power hack-saw is another useful tool in any small shop. These may be had in sizes to take anything from a 1-inch wrought-iron tube to a 6 in. by 12 in. rolled steel joist; and although the machine does not compare with the circular saw, it is capable of meeting our needs for repair or other work usually done in the shops.

Oxy-Acetylene Welding and Cutting.

One of the more recent methods of dealing with repairs is the oxy-acetylene process; and a few particulars of some of the work done may be of interest, and at the same time show its utility.

1.—A 5-inch cast-iron ram and kite belonging to a Cameron type pump was broken a little below the kite. The two parts were set to correct alignment and welded; and though the ram was fitted with a gunmetal liner to within an inch of the fracture, it was not disturbed or even fused. The cost of this was £1 10s.

2.—Malleable iron crosshead of the adjustable slipper type for 25 B.H.P. engine. The projections on which the slipper are centred were worn considerably. To these metal was added, and when completed the crosshead was in every respect as good as new, at a cost of 9s.

3.—Malleable cast-iron connecting-rod for small steam-engine. This was of the forked-end pattern, such as is seen on many engines of the vertical type. The ends of the fork were worn, and partly broken, though the large end showed little signs of wear. A satisfactory repair was made by welding two wrought-iron ends on to the malleable cast iron, the cost being 7s. 6d.

4.—Brake connecting shaft for 12 in. by 18 in. locomotive. The journals were worn; and under ordinary circumstances the only way to make same good would have been by making a new shaft, at considerable expense, owing to the amount of work involved. By the process under consideration, metal was welded to the worn portions of the shaft; and for £2 this was made practically new.

In addition to the above, we have had many other repairs done by oxy-acetylene—such as the welding of slide-valve rods and links, and connecting-rods of high-speed engines, filling in the washing-out plug-holes in locomotive boilers, &c. These, as well as work done by the cutting-out hopper plates, girders, &c., *in situ*, give sufficient proof of the usefulness of this method in many of the repairs to machinery and plant.

Case-hardening.

Many of the working parts of the engines and pumps are better able to withstand wear if, when made, they are subjected to the process of case-hardening. This consists in treating the surface of wrought iron or mild steel in its finished state by one of the many kinds of material supplied for this purpose. The larger and more important parts are packed in iron boxes with sufficient case-hardening material to cover all the surface to be hardened. These are then heated to a bright red heat, and allowed to remain in this condition for a length of time according to the depth of hardness required. The pieces are then taken out of the box and slacked out in cold water. Where it is sufficient to treat a very thin surface only, the parts may be heated on a smith's fire; and, while hot, the hardening material is spread over the surfaces, and allowed to remain for a few seconds, after which it is cooled quickly. What takes place is that, while hot, the metal takes up some of the carbon from the packing material, and is thus converted into steel at the surface. The depth of steel so converted is regulated by the length of time it remains hot. By proper treatment, wrought iron is hardened to a depth of $\frac{1}{32}$ inch after contact during four to five hours at suitable heat.

An example of its use may be taken from West's drawing machine. Anyone acquainted with this will know that the rake-bar is carried on a grooved roller at the end of the machine near the retorts. The pin supporting this is subjected to severe cutting action by reason of the close contact with the heat, dust, and water; and when the machine is on full work a mild steel pin with a soft surface will wear out in three or four days, while a pin case-hardened (say) to $\frac{1}{8}$-inch deep will work under the same conditions from twelve to fourteen weeks.

Lubrication.

This is a matter that requires very close attention, so far as it concerns the machinery of gas-works; and it is essential that the most suitable means should be adopted of lubricating bearings, so as to prevent undue wear and to ensure good working. Various methods are in use; and it is safe to say that no one system will be quite suitable for all purposes.

Lubricating greases are now largely used; and for many purposes these are highly satisfactory—especially for slow-moving parts of machines—provided that the lubricators are suitably fixed. These in many cases answer the double purpose of keeping out dust as well as a lubricant. The mode of fixing lubricators to plummer blocks is to make a clearance hole in the cap large enough for the nipple to pass through, and so screw directly into the half-step or bush. By so doing, waste is prevented, by ensuring that all the lubricant used is conveyed to the bearing surface. I have used grease with much success for the bearings of stoking machinery. Perhaps one of the more noticeable cases is the axles of such machines. These, owing to the heavy weight supported by them, are somewhat difficult to lubricate satisfactorily, by reason of the tendency to accumulate hard dirt in the grease-way. To overcome this we make a strong screw-down lubricator, with a coarse thread; and by means of this the passage can be kept clear of dirt, and so enable the grease to find its way to the bearing surfaces.

Before adopting the above, oil was used as the medium for lubricating this kind of bearing; and considerable difficulty was experienced in keeping the oil-way clear—the oil not being able to force a way through the dirt, with the consequence that wear and friction were considerably more than they now are.

We have in constant use a large coke-handling plant, consisting of breaker, elevator, and shaking screens. Grease is employed almost exclusively as the lubricant for the bearings, all of which are in close proximity to coke dust. With regard to the breaker, specially long bearings are provided both for the cutter-shafts and the gearing. This is of great assistance in retaining the grease, which at the same time is spread over a large wearing surface. As originally constructed, the bearings on this machine, owing to their short length, were worn out quickly, and gave us constant trouble. The screen is carried on ball-bearings in partially enclosed pedestals with inclined races; and it is very important that such bearings should not come into contact with coke dust. Here grease is the most satisfactory lubricant, as well as an admirable dust excluder.

Oil as a lubricant has its uses. For many purposes the syphon lubricator of the drop-feed type is most useful for bearings of engines, pumps, &c.; while for line shafts with plummer blocks of the self-oiling type a continuous supply of oil can be provided, with the result that wear is almost entirely eliminated. Here is a case in point: We have a length of shafting about 70 feet. The diameter of this is 3 inches, and the speed at which it runs is 260 revolutions per minute. This was originally fixed in plummer blocks of the ordinary merchant type, which were very short. Grease was used as a lubricant; and the trouble that was experienced was that the bearings constantly wore away—mainly, I think, owing to their short length, and not being able to retain the grease. The plummer blocks were replaced by those of the ring-

oiling type; and since these were applied there have been scarcely any signs of wear, though the shaft has run night and day during the past three years. In addition to the above, we have other running shafts working equally well in this type of bearing.

We find oil to be most suitable for the lubrication of bearings of coal-breaker claw-shafts. One way is to make the oil-hole large enough to insert a ⅜-inch wrought-iron tube. This is turned slightly less for a portion of its length, so as to leave a shoulder to rest on the top part of the hole, with an inch or so projecting above. This carries a glass needle lubricator. On removing the tube, any hard dirt that has accumulated in the end is brought up with it; thus ensuring that the oil-way is kept clear, enabling oil to pass through.

Piston-Rod and Valve-Spindle Packing.

Some years ago, after having had experience with metallic packings for piston-rods and slide-valves, I was convinced there were many advantages to be gained by their use in the elimination of a good deal of the friction, and subsequent wear of rods, &c. One of the disadvantages of the sectional metallic packings for small engines and pumps is their expense; and what I had to aim at was to make up a packing easily adaptable to the various sizes of rods and stuffing-boxes that had to be dealt with, and at the same time inexpensive. After experiment, we arrived at something that suited our purpose admirably. It consists of metal rings in halves, surrounded by soft packing of a suitable size to fill the stuffing-box. The advantage of this type is that it is not limited to any exact size. The construction of the rings used is accomplished without any machining whatever. They are cast in metal dies, after which the ends are cut to the finished shape. The slight groove at the back is used for holding them in position on the rod; this being particularly useful when fitted to vertical rods. The metal used is the same as that employed in lining bearings, and known as anti-friction metal.

The cost of packing by this method does not exceed (say) 1s. 6d. per lb.—a price by no means excessive if contrasted with that paid for packing of the more expensive kinds. As a proof of efficiency, I may say that we have piston-rods from which the packing has not been removed during the past eight years; and in one instance where a rod 2½ inches diameter when new has been in use almost continually for nine years, it is still within $\frac{1}{32}$ of an inch of that size, whereas previously it had to be turned every summer, owing to uneven wear caused by the asbestos soft packing. Some means of lubrication must be applied to rods fitted with metal packing, if the best results are to be obtained.

Asbestos Packed Fittings.

Fittings of this description are now largely used for boiler mountings, as blow-off cocks, water-gauges, &c., and also on carburetted water-gas sets, for the control of steam and oil operations. The repair of these present difficulties not always seen on first examination; and it often happens that when the grooves are repacked and put to work, the material disappears in a short time. Especially is this the case with cocks used on carburetted water gas steam connections. One reason for this is that the frequent turning of the plug during operations tends to wear away the gland packing, thus allowing the plug to lift. When this happens, it forms a space through which the steam and water pass, and in doing so the packing is torn or washed away. Again, when the grooves are not sufficiently well packed, the metal surfaces of the plug and body are brought together, causing a cutting action by reason of the excessive pressure set up when steam is on one side only—that is during the process of opening or closing.

To overcome these difficulties as far as possible, I have used a holding-down plate assisted by steel spiral springs between the nut and plate; and this to a great extent counteracts the lift, which does not depend on the gland packing to keep the plug in its place. We now get much better service from these than was the case previous to this slight alteration.

Packing for the grooves of cocks may be made with a good quality of asbestos fibre, to which is added rubber solution or boiled linseed oil, and sufficient flake graphite to make a well-lubricated mixture capable of being rammed tight into the grooves. Care should, however, be taken when preparing the parts of the cocks to ensure that there are no sharp edges of metal that may cut or scratch the packing, and also to keep the metal surfaces apart by strips of paper—these being removed after the grooves are well filled. This provides a bearing surface for the plug against the packing when the strips are removed.

Steam Pipe Arrangements.

Considerable trouble is often experienced in the conveyance of steam to the various points required. In many instances this is due to the inadequate provision for draining water after condensation, and in others to faulty joint making, or to the lack of a sufficient number of bolts in the flanges. The best means for removing water from steam mains is by the aid of steam-traps, and in some cases by the use of separators in addition to traps. Where possible the fall of pipes should be in the same direction as that in which the steam is travelling; the outlets for water, of course, being from the lower portions. When drained in this manner, and with suitable traps, it is possible to keep the pipes clear of water when steam is shut off for any purpose, and so avoid to a great extent the water-hammer that often takes place when steam is again turned on.

With the larger sizes of pipes, care should be taken to provide for their expansion. This can often be done by giving freedom to the bends or junctions, rather than by special expansion-joints. I have recently re-arranged a portion of mains that extend over a distance of about 250 feet, with the necessary bends, &c. One section of this as previously laid had given considerable trouble, owing to the fact that in expanding the pipes had to move in one direction only. When making the alterations, I took the precaution to allow for some movement to take place at a point where the direction of the pipe changed, by extending the distance between the bends; and in this way the difficulty has been overcome.

For high pressures of steam, wrought-iron or steel pipes are now largely used; these being more satisfactory and much safer than cast iron. The cost of each kind is about equal so far as straight lengths are concerned; bends, tees, and specials being more expensive in steel or wrought iron. There are many kinds of jointing materials for flanges of pipes; but my own experience is that corrugated brass rings with a manganese paste or cement are suitable in most cases. For joints where a particular size or shape is necessary, high-pressure jointing composed of rubber and asbestos is a good material for steam, water, or compressed air.

DISCUSSION.

The President (Mr. J. M'Nicholl, of Warrington) said the members had had the privilege of listening to an eminently practical paper; and he hoped the discussion which ensued would be profitable.

Mr. W. L. Heald (Preston) remarked that "in another place he had already confessed that he was "mechanically minded;" and a study of Mr. Edmondson's paper clearly showed him that the author was also mechanically minded. It surprised him (the speaker) to find how their thoughts ran together on the subject. It was only recently that they instituted at Preston the system of templates for the correct setting-out of renewals; but they had now templates for practically everything. They had also adopted a filing system for sketches, &c., as well as records, which could be easily referred to, of the dimensions of various parts, down even to a plug; so that they were always ready in case of emergencies. He could hardly sufficiently emphasize the importance of keeping records of parts which were not easily measurable. With regard to the question of getting out surplus metal for an article, not only was this unnecessary labour, but it was also wasteful. One was very apt, he thought, especially the first or second time of getting out a sketch, to reckon for too much metal. The tendency was, of course, to be always on the right side; but the keeping of exact records of materials required easily obviated this. Mr. Edmondson laid great stress upon the importance of the keeping of stock. Of course, he (Mr. Heald) had not the same amount of machinery running as the author, but they certainly endeavoured to take and keep stock correctly every three months. In the case of spare wheels, change wheels, or any part in constant use, the systematic quarterly stocktaking ensured there always being a spare part available should a breakdown suddenly occur. At Preston they found that, in effect, a three-monthly stocktaking guaranteed their having a replaceable part at any time. Mr. Edmondson had drawn attention to the more recent method of dealing with repairs by the oxy-acetylene process. At Preston they did both cutting and welding; but he thought it was in the cutting that the process stood out pre-eminent, so far as the equipment of gas-works was concerned. Mr. Edmondson showed that a 5-inch cast-iron ram and kite belonging to a Cameron pump was broken a little below the kite, and repaired for 30s.; and also how a malleable cast-iron connecting-rod for a small steam-engine was satisfactorily repaired by welding two wrought-iron ends on to the malleable cast iron, at a cost of three half-crowns. When they looked at these figures—30s. and 7s. 6d. —they would be surprised, and especially taking into consideration the cost of new parts. But he certainly thought that, as a cutter for ripping-out portions of hoppers, and cutting angle bars (either the cross-cut or otherwise), it was a paying proposition, on account of its quickness and general utility. He was interested to hear what the author said about flux. Perhaps he would be good enough to inform the members whether any flux was required in the welding of cast iron. Dealing with the lubrication question, he (Mr. Heald) agreed that in coke-handling plants, and especially the breaker, grease was the most satisfactory lubricant and was a very good dust excluder. With regard to lubricating stoking-machines, he looked into the matter some time ago on the charger axle lubricating question, and he then fitted a ¼-inch syphon pipe on the underside of the axle against the shafting itself, and against this he placed a felt pad fairly well lubricated with ordinary oil. The author's remarks on the question of packing were most interesting. In his (the speaker's) opinion, however, metallic packing was the cheapest for an exhauster engine. After a reference to the subject of making packings in certain sizes, Mr. Heald asked whether a mechanical hack-saw for cutting was worth the money usually asked for it. He referred, of course, to small repair shops. In many cases he feared that the man using the saw lounged about while the machine was doing the work. At any rate, he had seen such a thing occur at one place in Preston.

Mr. E. Ingram (Great Harwood) said, with regard to the substitution of grease for oil on the coking plant, his experience had been rather contrary to that of Mr. Edmondson.

Mr. E. W. Wilson (Farnworth) said he was quite convinced

that the use of corrugated brass rings with a manganese paste was a great advantage on steam and high-pressure work. He had employed it himself with the most satisfactory results. With reference to the duplication of parts, he quite agreed with Mr. Edmondson on the advisability of this being carried out, because some parts took eight or ten hours to remake, and this might entail very serious loss. The remedy, of course, was now in their own hands; and the suggestions advanced in this respect should be taken to heart. The question of keeping templates for different parts had been mentioned. They did that at his place, and out of sheet tin.

A MEMBER: Sheet zinc?

The PRESIDENT said he should be compelled to close the discussion on account of the lateness of the hour and members having trains to catch for rather long journeys. First of all, however, he desired to congratulate Mr. Edmondson, in the most cordial manner, on the excellence of his contribution to the "Transactions" of the Association. The figures he quoted in regard to the upkeep of plant, most of which had been in constant use during the last eighteen to twenty-five years, were remarkably small, as those who had had experience with similar plants would be well aware. The cost of repairs per ton of coal carbonized for coal gas at 1 805d. was extremely low; as was also that of the carburetted water gas, at 0·071d. per 1000 cubic feet of gas made. Both figures were extremely low. With regard to the internal and external cylindrical gauge for the measurement of standard sizes when making interchangeable parts, he presumed this useful article was bought from the manufacturers, or was it, by any possibility, made by themselves?

Mr. EDMONDSON: No; they are purchased.

The PRESIDENT asked whether the author could give him any idea of the life of twist drills as compared with that of the ordinary drill. With regard to the question of the oxy-acetylene plant, he had not had any experience of it for welding; but for cutting purposes it was remarkably effective. Was the cost prohibitive in the case of small works? He was afraid it would be, as it would only be used a few times a year.

Mr. HEALD: You would really be surprised—anyone would be—to find how many times it is necessary to use the plant in the course of a year.

The PRESIDENT remarked that for small works, where there was only a small plant, and a limited demand for welding or cutting, there would always be an ironfounder within easy distance. Did it require any experience to be able to weld with this plant? He had listened with great interest to what Mr. Edmondson had said in regard to case-hardening; but would it not be better to have a case-hardening furnace? With regard to the lubrication of the coke-breaker, this was one of the places where grease was constantly required. It was not sufficient that it should be attended to occasionally; regular attention was imperative. He was rather interested in the question of packing; and he would like to know whether dies were required for either size of shafting. If this was so, he thought they would have to be equipped with an enormous number of dies. He would also like to know if Mr. Edmondson had found any packing effective for ammoniacal liquor. This was one of the most difficult things for which to get suitable packing. With reference to cocks for steam purposes, he had not found any effective lubricant for this. In his experience, valves were much better than cocks.

At this stage the President pointed out that there was not sufficient time at their disposal to enable the author to reply, and suggested the Technical Press as the medium. This course was unanimously agreed to.

REPLY ON THE DISCUSSION.

Mr. EDMONDSON's replies to his questioners are as follows:

Oxy-Acetylene.—I have had no experience, with the actual use of the oxy-acetylene apparatus, and so cannot say whether or not any flux is required in the welding of cast iron. Our own work done by this process is executed by a local firm, as up to the present we have not been able to satisfy ourselves that it would pay to keep plant for the amount of work we have to do.

Charger-Axle Lubricating.—The machines used at Preston, mentioned by Mr. Heald, are of a more modern type than our own, with better facilities for lubricating the various parts. The machines I have to deal with are fitted with axle bearings, having just a plain bronze bush. To replace these with bearings spoken of by Mr. Heald would have entailed a large expense, owing to the construction of the machine in other details; whereas, by adopting the method explained, we attain the improvement desired —*i.e.*, by having a simple lubricator strong enough to force grease on to bearing surface.

Metallic Packings.—Owing to the very numerous diameters of rods and spindles in use at our works, it was thought that a method having a certain amount of flexibility would suit us better than packings, which require to be made to a definite size in each case for which they are used. Hence the adoption of the system of which particulars are given. The dies used for making the semicircular pieces have the groove cut out to a suitable shape, with a round piece of iron to form the core. The metal is then poured into the mould thus formed. The rings can be opened or closed (say) from 2 inches diameter to $2\frac{1}{8}$ inches, to $1\frac{7}{8}$ inches, and to other sizes in the same ratio; so that with five dies—1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, and 2 inch—any size of rod can be fitted between $\frac{7}{8}$ inch and $2\frac{1}{8}$ inches.

Hack Saw.—In our own shop the working on the power hack saw is mainly done by a shop labourer who has to do other work, such as giving assistance where required; and thus he is able to leave the machine running for periods while he is attending to other work.

Lubrication.—The lubrication of the sliding portions of the conveyor chain, as mentioned by Mr. Ingram, is, no doubt, done more efficiently with oil. Grease in such cases does not keep on the bearing surface, but is forced to the edges, and so becomes useless. My experience with spring or other automatic grease lubricators is that these become ineffective, either through faulty plungers or owing to the air-space becoming filled with grease. The lubrication of the bearings of a coal-breaker is a somewhat different problem when one has to deal with those of a coke-handling plant. In the first case, the dust is not so destructive, and to some extent acts as a lubricant if kept moist with a thin oil. But with coke-handling machinery the dust must be kept from the bearing to prevent its destruction; and for shaft bearings grease greatly assists in attaining this end.

Drills.—With reference to twist drills, there is no doubt that it pays to use them in preference to the ordinary forged drills. The sizes are standardized, while the difference in time taken to do the same amount of work is so great as to leave no doubt in my mind as to which kind should be used.

Plug-Holes, &c.—The mention in the paper of plug-holes of locomotive boilers is where these are worn by corrosion, &c., so as to leave the thickness of plate unsatisfactory at the threaded portion. By welding metal around the holes, and re-tapping to the original size, these are made good much more cheaply than by cutting out the plate or by fixing a cover-plate with a new plug-hole.

Case-Hardening.—This requires to be done in boxes, in order to keep the material in contact with the pieces under treatment; the boxes, together with the parts, being afterwards heated in a gas-furnace such as is made for the purpose.

PRODUCTION OF LIGHTING AND HEATING GAS.

A few years ago M. Léo Vignon took out a patent for France for a process for producing lighting and heating gas by the action of steam, at a temperature of 600° to 800° C. (1112° to 1472° Fahr.), on a mixture of carbonaceous fuel and lime; the resulting gas being composed chiefly of hydrogen and methane. This temperature was selected because it is below that of the decomposition of the carbonate of lime (900° C. or 1652° Fahr.) formed in the reaction; and the object in view was to obtain gas which was uncontaminated by carbon monoxide or dioxide. The inventor has, however, found that by heating the mixture at temperatures higher than 800° C., and reaching even 1100° C. (2012° or 2192° Fahr.), the following results are obtained: (1) The speed of the reaction is much greater. (2) The temperature of decomposition of the carbonate of lime being exceeded, the carbonic acid formed in the reaction is liberated. The lime remains in the free state, and continally co-operates in the reaction with its entire mass; consequently the proportion of lime required for the reaction can be very considerably reduced. (3) The gas produced contains methane, hydrogen, carbonic acid, and (according to the conditions of work) a proportion of carbon monoxide more or less appreciable.

In order to purify the gas, the carbonic acid is first taken out by one of the known means (lime, potassium carbonate, water, &c.); then, when necessary, it is passed over lime, maintained at about 400° C. (752° Fahr.), to transform its carbon monoxide into methane and hydrogen, in accordance with the process described in the principal patent of the applicants [No. 416,699, of 1909]. The speed of the reaction and the proportions of the different gases vary with the degree of temperature, the quantity of steam, the rates of flow of the gaseous currents, &c.

The mixture of lime and carbonaceous combustible, in lumps, dust, dried paste, briquettes, or any other suitable form, is put into retorts or tubes made of iron or refractory materials. The temperature is increased from 800° C. to that which is found best for the work, a current of steam is run into the tubes or retorts, and the gas collected at the outlet of the apparatus. It is then suitably purified for the object for which it is to be employed; the carbonic acid and, when necessary, the carbonic oxide being retained by the methods previously mentioned.

A Price and Quality of Gas Question Settled in Minneapolis.—A correspondent of the "American Gas Light Journal" writes: "Under the agreement between the authorities of Minneapolis and the Minneapolis Gaslight Company, by means of which an end is put to a lengthy controversy over the gas rate to obtain in that city, the schedule is to be: From April 1, 1914, to Jan. 1, 1916, 80 c. per 1000; from Jan. 1, 1916, to Nov. 1, 1918, 77 c. per 1000. It is further agreed upon that consumers who have paid for gas at the rate of 70 c. per 1000 since the ordinance naming such figure went into effect last November shall not be sued for the difference, and that all consumers who paid at the former 85 c. rate shall be given a rebate of 15 c. per 1000 on all bills paid at that rate. It is further stipulated that the Company may reduce the candle value from 18 to 15, provided the heating value is not reduced to less than 600 B.Th.U. per cubic foot."

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Glasgow Gas Finances.

SIR,—In reading over your report of the meeting of the British Commercial Gas Association at Newcastle, I notice that my remarks are not quite correctly given.

The revenue of the Glasgow Gas Department is about £1,022,000; and the population of the city is about the same figure.

With reference to the profits of the undertaking, your report says: "Prior to that time [about four years ago] they used their profits for the relief of rates." This should read: "They could, but did not, use their profits for the relief of rates." I think, however, this is generally known.

Glasgow, May 8, 1914. THOS. PAXTON.

Co-Partnership at Brentwood.

SIR,—I notice in the "JOURNAL" of the 5th inst. an extract from the May issue of the "South Metropolitan Gas Company's Co-Partnership Journal," in which it says that the Brentwood Gas Company have adopted co-partnership.

We have not yet done so; but my Directors have the question under their serious consideration.

Brentwood Gas Company, May 6, 1914. A. E. JOHNSON, Secretary.

Analysis of Coal Gas.

SIR,—With reference to your account of the work done by M. Ch. Ab-der-Halden on the analysis of coal gas by means of the Bunte burette.

It emphasizes once more what is only too well known to a careful worker with gases—namely, that the analysis of the mixture of gases known as coal gas is a matter of great difficulty, and not to be lightly undertaken.

The remarks of M. Ab-der-Halden on the absorption of saturated hydrocarbons is of considerable interest, and no doubt a great point in favour of combustion methods for carbon monoxide determinations, rather than the absorption method. However, 30 c.c. of cuprous chloride, and the even larger quantity which is so often used with the Bunte burette, is a very large quantity of liquid indeed; and it is a doubtful process altogether to submit gaseous mixtures to the influence of such large masses of aqueous solutions when an exact analysis is required.

The use of smaller quantities of reagents—such as 2 c.c. to 5 c.c.—is surely better; and this can be done when analyses are made over mercury in apparatus of the type devised by Frankland and M'Leod, and later modified into a more compact form by Messrs. Bone and Wheeler.

The occurrence of ethane and higher homologues in coal gas is by no means a lately-known fact in England. Wheeler, in a Government report on work done in connection with explosions in coal mines, noted several years ago that ethane occurred in marked quantities (up to 5 per cent.) in many coal gases. The reason why this was not more generally known is that, in an ordinary explosion analysis, any ethane or propane is put down as methane. The methane and hydrogen values are (in a manner not easily detected) thrown quite wrong; and many, if not most, published analyses of coal gas are quite wrong on these two points.

However, the nitrogen content, determined by difference, *is absolutely unaffected.* An analysis may be repeated; comparable figures may be obtained; nitrogen values may agree absolutely. In fact, a direct determination of nitrogen by combustion over copper oxide may be made; and this direct figure may agree with the figure obtained by difference. All these agreements may be obtained, and yet the *figures for methane and for hydrogen may be quite fallacious in any one analysis.*

It is owing to this not easily-detected fault of the explosion method of gas analysis that the presence of ethane has been so long overlooked in coal gas by many of us; and it shows how easily one can be lulled into a dangerous complacency by desired and expected agreement in results. Results which agree are not always right. In cases where the explosion method for the analysis of coal gas containing ethane is employed, either the oxygen used up must be measured, or the hydrogen must be previously absorbed and estimated before the methane is burned.

The following figures will explain what I mean to all those familiar with gas analysis. Let there be taken for analysis 100 parts of each of the following gaseous mixtures:

1.	2.	3.
CH_4 = 40 per cent.	CH_4 = 40 per cent.	CH_4 = 40 per cent.
H_2 = 50 ,,	C_2H_6 = 10 ,,	C_4H_{10} = 10 ,,
N_2 = 10 ,,	H_2 = 40 ,,	H_2 = 40 ,,
	N_2 = 10 ,,	N_2 = 10 ,,

The samples Nos. 2 and 3 contain ethane and butane respectively. On making an explosion analysis in the usual way and, as usual, counting all carbon dioxide as being derived from methane, we get three results:

1.	2.	3.
CH_4 = 40 per cent.	CH_4 = 60 per cent.	CH_4 = 80 per cent.
H_2 = 50 ,,	H_2 = 30 ,,	H_2 = 10 ,,
N_2 = 10 ,,	N_2 = 10 ,,	N_2 = 10 ,,

Now I believe it is very rarely that ethane is allowed for in coal gas analyses in the ordinary way. And yet, in the above results, we have it quite plainly set forth that *the methane and hydrogen figures in an analysis may be as much as from 20 to 40 per cent. wrong without the nitrogen figure being put out at all.* The examples given are, of course, extreme. But they serve to indicate with what reserve figures which add up to 100 per cent. should be received, and also to what extent many published analyses of coal gas are incorrect with respect to the figures for methane and hydrogen.

I trust that the practical importance of this ill-recognized pitfall in analysis will serve as excuse for a somewhat lengthy letter.

Acocks Green, Birmingham, May 6, 1914. H. H. GRAY.

REGISTER OF PATENTS.

Retorts for Manufacturing Illuminating and Heating Gas.

ELBORNE, S. L., of Peterborough, and GODSAL, H., of Chesham Street, Belgrave Square, W.

No. 9176; April 18, 1913.

This invention is designed to render impervious to gases fire-clay retorts for use in the manufacture of gas by the distillation of coal. Various treatments for such purposes, and their alleged disadvantages, are noticed by the patentees, who then proceed: The present invention has for its object, without the addition of expensive ingredients, to obviate the disadvantages by employing, in conjunction with the fire-clay or fire-clay mixture ordinarily suitable for the manufacture of rigid porous gas-retorts, another clay—for instance, China stone—which "at the highest temperature of manufacture will merely become incipiently vitrified, and thus, while preventing the passage of gas, will leave a surrounding highly rigid structure."

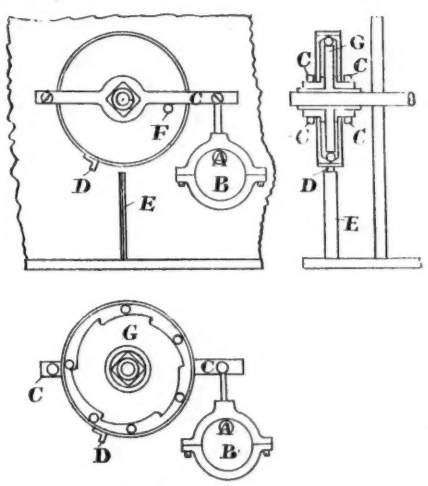
The less refractory clay may be incorporated throughout the mass of the other clay, or may form layers external or otherwise; but if external, each layer should be of substantial thickness—say, not less than ¼ inch. "Preferably it is employed as an internal layer or layers not directly exposed to the action of the fire or the decomposing coal, in which case it is found to yield under high temperatures in such manner as to preserve the retort from cracking or minimize such a tendency, while at the same time preserving the rigidity of the whole in virtue of the surrounding more refractory portion."

Gas-Meter Counting or Recording Apparatus.

ROOKE, T., of Victoria Street, Westminster.

No. 14,322; June 20, 1913.

This gas-meter counting or recording mechanism is of the kind that is operated by an oscillating clutch, and is intended to provide an improved construction of mounting for the part of the clutch which carries the operating pawls or their equivalent.



Rooke's Gas-Meter Counter.

The illustration shows one form of the apparatus with a sectional elevation and an elevation having the outer parts removed to show the clutch.

The operation of the mechanism is as follows: The spindle A is rotated by the passage of gas through the meter, and, by means of the eccentric B, oscillates the double lever C and the bushes connected to it; the arc through which these parts oscillate being slightly greater than that through which it is at any time desired to oscillate the box in which they operate. When oscillating in one direction (shown as an anti-clockwise direction) the lever C or the bushes will, by friction, carry with them the box, until further movement of the latter is prevented by the projection D coming against the stop E. The lever and bushes continue their movement as far as the eccentric B carries them, and then begin to oscillate in a reverse or clockwise direction. Since the friction between the bushes and the box is insufficient to drive the meter mechanism, the lever C will move backwards (in clockwise direction) without moving the box until the lever comes against the pin F, whereupon the box is made to move in the same direction, and the balls which have jammed between the box and clutch wheel G carry the clutch wheel round and advance the counting or recording mechanism by a proper amount.

The arc through which the box can be made to oscillate, and consequently the amount by which the clutch wheel G is advanced at each oscillation by the movement of the lever C, will vary with any change in the position of the stop E.

Vertical Gas-Retorts.

DRAKES LIMITED and DOBSON, A., of Halifax.

No. 8524; April 11, 1913.

This invention consists in forming the secondary air-flues of vertical retorts in the walls of the structure and on the outside of the combustion chambers which surround the lower ends of the retorts; the air passing through them being conducted through vertical uptakes (in which dampers are arranged at various heights) to support combustion in any parts of the combustion chambers situated above the air-flues.

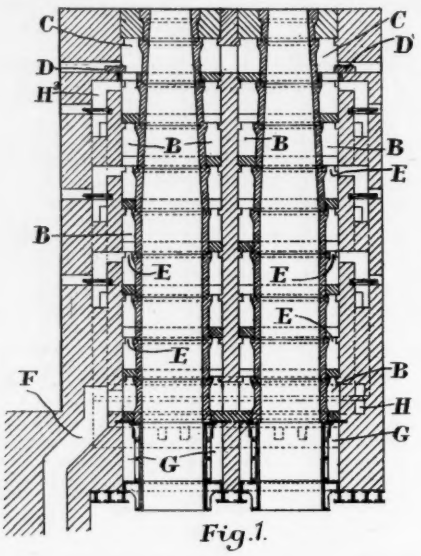


Fig. 1.

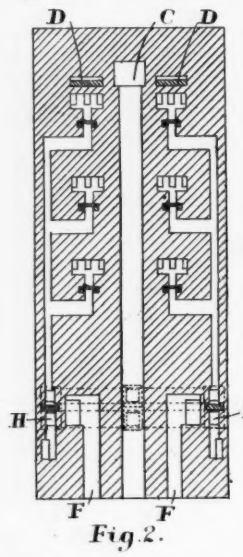


Fig. 2.

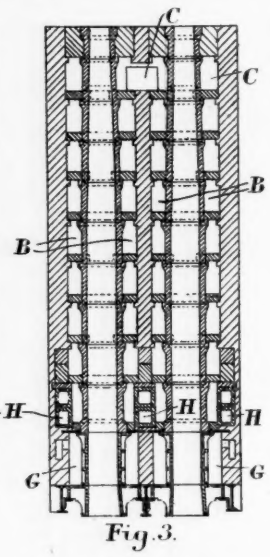


Fig. 3.

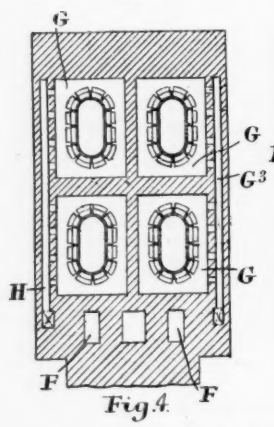


Fig. 4.

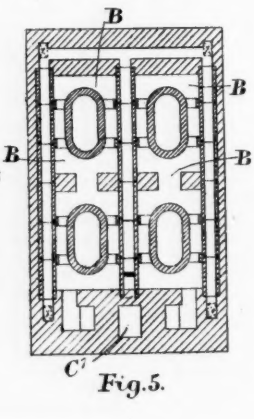


Fig. 5.

Dobson's (Drakes Limited) Vertical Retorts.

Figs. 1, 2, and 3 are sectional elevations. Figs. 4 and 5 are plans, showing the structure below the retort.

The retorts are surrounded on all sides by the chambers or cavities B, in which are circulated combustible gases for heating same, supplied firstly to the upper compartments by way of, or through, the passages C from the uptake when the dampers D are open to permit their passage, so that the gases, as they are burned or as they travel downwards, pass through openings E to traverse the series of compartments B, each of which is passed through in its order, until finally the spent gases escape near the lower end of the retort by the flues F as usual.

Beyond the lower end of the setting, and surrounding the discharge orifices of the retorts, are open spaces G, and leading into these from the open air are the openings which admit air to the flues, which extend along the side walls of the structure, as shown by fig. 4. These flues open vertically by passages into the ends of the flues H, which extend along the side walls above and beyond the flues to branch to the right and left along the end wall of the structure, as do the flues above. Further than this, the flues extend from the parts situated in the end walls to pass centrally between the retorts until a part is reached (near the uptake) when a vertical opening leads into the central part of the flue directly above. The gases then pass along this central part until the end wall is reached, when they split into currents which travel right and left along the flues. Some portions of the currents escape vertically through passages at the first corners of the structure; while the remainder travel along the flues in the side walls to escape vertically by passages leading to the branching flues, by which they enter the combustion chambers B past the damper which the attendant may arrange to have open. In this way it is possible to admit heated air from the flues to the compartments B in any quantities that may be found desirable.

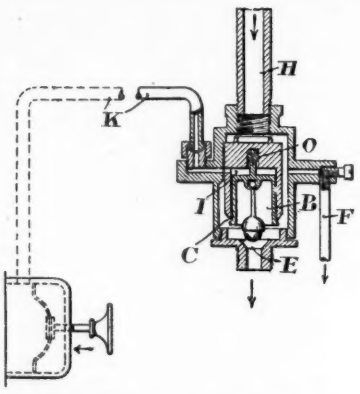
The setting is so constructed that each retort occupies its own separate series of compartments. The compartments near the top of the retorts are common to the whole series, with such provision (as by the dampers D) that any one or more of the retorts in the series may have its setting shut off from the rest. Thus any one or more of the retorts may be thrown out of use to permit repairs, cleaning, or other operations to be carried out, or to enable any increase or decrease of the plant in use to be readily effected.

Pneumatic Distance-Igniters for Gas-Lamps.

DEUTSCHE CONTINENTAL-GAS-GESELLSCHAFT, and MUCKE, F., of Dessau, Germany.

No. 28,716; Dec. 12, 1913. Convention date, Feb. 3, 1913.

According to this invention, a "safe ignition and tight gas closure" are attainable in pneumatic distance-ignition devices by arranging the terminal of the pneumatic conduit above a hollow piston which is movable axially in the gas-passage and suspended in which is the valve employed to close or open the gas-passage, as the piston is actuated. It is thus possible, in the closing action, to throw the valve on to its seat by the force set up by the shock or impulse of the pressure, whereby also any dust or dirt particles that may have reached the seat are forced away, and a sound closing action is attained.



A German Pneumatic Gas-Lighter

Arranged in a cylindrical casing screwed into the gas-supply conduit is a hollow piston B, provided with a turned-over closing edge C. Suspended within the piston in a flexible manner is a ball adapted in the lowest position of the piston to close the gas-passage E leading to the main flames. The gas-passage leading to the ignition flame is independent of the piston movement, since the ignition-flame conduit F is in constant communication with the main gas-conduit H, thereby constantly feeding the ignition flame. The cylinder chamber I, above the piston, communicates with a conduit K, arranged in which are members adapted to produce a suction or pressure effect. As shown, the conduit is provided at its end with pneumatic pressure mechanism comprising a casing arranged in which is a diaphragm adapted to be moved to and fro by a knob.

The chamber I and conduit H are filled with gas passing between the piston and the cylinder. In the inward movement of the knob a pressure action is set up, and the piston is thrown into its lowest position, in which the ball is caused to close the main gas passage E. The gas contained in the passage K is thereby forced out between the piston and the cylinder. When the knob is moved in an outward direction, the suction effect causes the piston to rise and the ball to be lifted from its seat; and owing to the pressure of the gas, which is thus freed to flow to the main flame, the piston is held in its upper position. In order, however, to prevent the piston dropping as a result of shocks, or of the counter-pressure of the gas entering the passage K, it is preferably held in its highest position by locking mechanism—for instance (as shown), by a resilient slotted and ball-headed pin O adapted to enter a corresponding opening in the cylinder-casing.

Gas-Producers, Coal Distillation Retorts, &c.

ANDERSON, W., of Helensburg, MEIKLE, J., of Maryhill, Glasgow, and FULTON, C. W., of Paisley.

No. 11,712; May 20, 1913.

This invention relates to gas-producers, coal distillation retorts, &c., equipped with screw conveyors whereby coal or the like is delivered continuously at the upper end of a container or magazine, and the ash or coke is withdrawn continuously at the lower end. The invention has for its primary object to provide an improved arrangement of screw conveyors of the type described in patent No. 12,521 of 1913, so disposed relatively to the furnace proper of the producer or retort as to provide for the automatic and practically continuous delivery or removal of the coal or of the ash or coke, without interference with the air supply, which requires to be carefully controlled in order to ensure regularity of combustion, &c., and "in the case of a retort or the like, in such wise that undesired admission of air shall be effectually prevented."

To this end, there is provided a helical feeding-in conveyor extending from a point outside one vertical wall of the chamber, and disposed horizontally in a tubular pocket formed in the vertical wall, with a gap opening into the interior of the chamber at or about the upper level of the material maintained within the chamber—the arrangement of conveyors being similar to that noticed in patent No. 4446 of 1912.

The conveyor delivers coal from a hopper outside the chamber into the interior of the chamber; the passage being closed against admission of air. That is to say, the hopper entrance may be normally maintained closed and opened at intervals only, as by means of a revolving shutter or the like—the coal being uniformly distributed over the bed of fuel. The lower end of the chamber is preferably of V-section; the sides of the V merging into the sides of a trough open on the top and closed at the bottom. Within the trough is disposed a helical conveyor for removing ash or coke as the case may be—constructed substantially as described in the first-mentioned patent; the non-threaded sections being preferably fitted with spikes for breaking up the clinker. In the case of a gas-producer, air may be admitted beneath the sides of the V (which latter may be constituted by grate bars), and a regulated quantity of air, or no air, may be admitted at the upper end of the chamber; the gas outlet being at a suitable point intermediate the upper and lower ends of the chamber.

APPLICATIONS FOR LETTERS PATENT.

RESTORATION OF LAPSED PATENT.

Notice is given that an order was made on May 1 restoring the letters patent granted to HENRY HOWELL for "An improved incandescent burner cluster for inverted lighting." No. 20,286 of 1905.

10,320.—STONE, G. S., "Gas water-heater." April 27.
10,339.—HARGER, J., "Removal, detection, and estimation of carbon-monoxide from and in gases." April 27.
10,383.—MARKL, A., "Production of a liquid fuel and illuminant from tar." April 27.
10,408.—FLEISCHER, E., "Producer gas." April 27.
10,413.—PEARSON, G. A., "Pilot-lights." April 27.
10,457.—KELLERMANN, J., "Lighting appliances." April 28.
10,501.—KILLAR, C. F., "Incandescent gas lighting." April 28.
10,502.—KILLAR, C. F., "Mantles." April 28.
10,526.—BAÁN, J., "Liquid meters." April 28.
10,536.—THIÉBAUD, L., "Operating cocks." April 28.
10,630.—BRAYSHAW, S. N. & E. R., "Gas-furnaces." April 30.
10,656.—WRIGHT, A. C., and KING, F. H. W., "Coin-controlled meters". April 30.
10,681.—BIDDLECOMBE, F. G. L., "Gas-producers." April 30.
10,699.—RESTLER, J. W., "Fixing meters." April 30.
10,757.—RICHMOND GAS-STOVE AND METER COMPANY, LTD., and RANSOME, J. A., "Gas-discharge conduit." May 1.
10,780.—BONNEAU, L. C., and HASENFRATZ, V. E., "Treating spent material from gas purifiers." May 1.
10,781.—URIE, R. W., "Connecting pipes or conduits." May 1.
10,793.—SMITH, E. W., "Coin-freed meters." May 1.
10,812.—GLASFABRIKEN UND RAFFINERIEN JOSEF INWALD AKT.-GES. "Light reflectors or globes." May 1.
10,814.—JACKSON, A., and CARBIC, LTD., "Gas-generating apparatus." May 1.

LEGAL INTELLIGENCE.

ALLEGED ENCROACHMENT ON A GAS COMPANY'S AREA.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Monday, May 4.

Before the MASTER OF THE ROLLS, *Lord Justice* SWINFEN EADY, *and Lord Justice* PICKFORD.)

Whittington Gas Light and Coke Company, Limited, v. Chesterfield Gas and Water Board.

This was an appeal by plaintiffs from the refusal of Mr. Justice Eve to grant an injunction under circumstances which were set forth at length in the "JOURNAL" for Dec. 16 last, p. 890.

Mr. MAUGHAM, K.C., and Mr. BRIDGES appeared for the appellants; Mr. GEORGE CAVE, K.C., and Mr. SCHOLEFIELD represented the respondents.

Mr. MAUGHAM said this was an appeal by the plaintiffs from the order of Mr Justice Eve refusing an injunction. Plaintiffs were a Limited Company supplying gas within the parishes of Brimington and Whittington, in the County of Derby; and the defendants were a Board having statutory power constituted by the local authority supplying gas and water in Chesterfield and the surrounding districts. The dispute arose owing to a difference between these two bodies—the plaintiffs alleging that the defendants had been poaching in their district, contrary to the provisions of two Acts of Parliament. The defendants said that what they had done was not within the prohibition. In 1855, the Statutory Company obtained an Act in which the Gas-Works Clauses Act, 1847, was incorporated. In 1865, defendants' predecessors were given powers in an extended area; and it appeared from the Private Act of that year that plaintiffs were already supplying gas in Brimington and Whittington. There was a recital that it was expedient the Company should supply gas and water within the two parishes; and that the Act of 1855 and the powers and provisions thereof should apply to, and include, the parishes of Brimington and Whittington, as if these places had been originally included within the powers, and as if the Act had expressly enacted that the limits should include the township—provided that "it shall not be lawful for the Company to extend their mains for the supply of gas in the parishes of Brimington and Whittington unless with the previous consent in writing of the Whittington Gas Company." In 1876, the defendants secured an Act with which was incorporated the Gas-Works Clauses Act, 1871. In 1895, the respondent Board were constituted, and the undertaking vested in the Company became vested in them. Under this Act, the restrictive section was repeated. Section 4 provided for the limits of supply, and then said: "It shall not be lawful for the Board to extend the existing mains of gas in Brimington and Whittington unless with the previous consent in writing of the Whittington Gas Company." In 1896, the plaintiffs applied for statutory power; and they were successfully opposed by the defendants. What had happened was this. At the date of the first Act, the defendants' predecessors in title had a main which went for a short distance into the parishes of Brimington and Whittington through Sheffield Road, and into Chapel Street and Duke Street. In Foundry Street they had no main; and this was the street in which the plaintiffs alleged the defendants were now poaching, by putting down a pipe and supplying Green's Foundry with gas for lighting and for an engine. The cost of the extension was £20 16s., of which Green paid £3. The plaintiffs charged 2s. 4d. per 1000 cubic feet for power; while the defendants charged 1s. 10d. So one could well understand that Green was anxious to take his supply from them. The plaintiffs, when they heard what had been done, remonstrated—alleging that a main had been laid. To this, the defendants replied that it was merely a service-pipe. The prohibition was against the extension of a "main." The Court might say the pipe was a hybrid affair—that it was not quite a service-pipe or an ordinary main. But it was an extension of a main, within the true meaning of the protective clause.

Without calling on respondents' Counsel,

The MASTER OF THE ROLLS said the protective proviso on which plaintiffs relied did not prevent the defendants from extending any pipe or pipes for the supply of gas. The prohibition related to the extension of mains. It might be difficult to determine whether a particular pipe was or was not a main; but he altogether declined to accept the view that this was a proviso which prevented the defendants, without the written consent of the plaintiffs, from doing anything in either of these parishes except supplying a new customer they were under a legal obligation to supply. He could see nothing to prevent the defendants from supplying people with gas beyond the 25 yards limit from the existing mains, provided it was done by means of a pipe which would be held not to be a main. Here there was such a finding, and therefore the appeal was hopeless, and must be dismissed.

ACTION AGAINST THE WELSBACH COMPANY.

In a Divisional Court of the King's Bench last Tuesday, before Justices Ridley and Bray, Mr. Croom Johnson applied in the case of *Ehrich and Graetz v. Welsbach Light Company*. This, he said, was a motion to set aside the award of an Arbitrator. It was a matter of some complication, and the parties had agreed that it was a case which would be extremely difficult to argue on affidavit evidence. They had therefore agreed that there should be no order on the motion to set aside the award; and on certain terms it was arranged that the Welsbach Company should bring an action in the Commercial Court on the award. He had the consent of the other side to this course.

Their Lordships assented.

ELECTRICITY CHARGES AT LONG EATON.

Attorney-General at the Relation of the Long Eaton Gas Company v. Long Eaton Urban District Council.

Judgment in this case was fixed to be delivered to-day; and a report of it will be given in next week's "JOURNAL." It will be recalled that by the action, which was heard before Mr. Justice Sargant [*ante*, pp. 51, 130], the plaintiffs claimed a declaration that the charges made by the defendants for the supply of electricity were an undue preference, and *ultra vire* within the meaning of the Electric Lighting Act, 1882.

Weigh-Ticket Frauds.

At Darlington, last week, a private carter named Edmondes was charged with obtaining money to the amount of £1 3s. 6d. by false pretences, and was bound over to be of good behaviour for twelve months. It was stated that prisoner carted coke for the Corporation, and by altering the weigh-ticket had obtained more than the value of the load. He admitted the offence to a customer who complained, and offered to make what restitution he could. The Gas Committee, however, decided to prosecute, in order to protect the public.

LIVERPOOL UNITED GASLIGHT BILL.

HOUSE OF LORDS COMMITTEE.—Monday, May 4.

(*Before Lord* CLINTON, *Chairman, Earl* GORELL, *Lord* ERSKINE, *Lord* RAVENSWORTH, *and Lord* MONKSWELL.)

The proceedings in the Liverpool Gas Company's Bill were resumed this morning. [The opening speech of Counsel was given in the "JOURNAL" last week, p. 361.]

Counsel for the promoters were Mr. HONORATUS LLOYD, K.C., Mr. VESEY KNOX, K.C., Mr. CLODE, K.C., and Mr. JACQUES ABADY. The opponents were the Liverpool Corporation, represented by Mr. BALFOUR BROWNE, K.C., Mr. G. J. TALBOT, K.C., and Mr. COURTHOPE MUNROE; the Bootle Urban District Council, by Mr. J. W. JEEVES; and the Lancashire County Council, by Mr. FORBES LANKESTER, K.C.

Mr. *H. Wade Deacon*, the Chairman of the Company, said the proposed conversion of capital was to transform the existing 10 per cent. and 7 per cent. stocks into a uniform 5 per cent. stock. It was felt that this conversion would enable the Company to issue new stock on better terms than under present conditions. The Company were advised that the £1,000,000 new capital asked for in the Bill would be required within twelve years. As to the substitution of a calorific value test for an illuminating power test, in 1893 the Company's advisers took the view that a high illuminating power was essential; whereas the Corporation then thought the value should be lower. Since then the Company had been advised by Mr. Charles Hunt that a lower candle power was the right thing. Apparently, however, the Liverpool Corporation had now changed their views and opposed the lower candle power, although in 1895 they asked for a lower illuminating standard. The Company now felt that they should, in fairness, be placed upon the same basis as all other companies in this matter. With the present price of coal the Company could not continue to sell gas at 2s. 1d. per 1000 cubic feet without some modification of their powers; and there was every probability of an increase to 2s. 3d. in the absence of such modification. The proposal to change the name of the Company to that of the Liverpool Gas Company was not opposed. As to the sulphur restrictions, the Company asked that the recommendations of the Departmental Committee of 1904 should be applied. Practically all gas companies in the country were relieved from them at the present time. The reason for asking power to charge up to 6d. extra in the new area was that it might be found more expensive at the commencement to supply there than in the other parts of the area; but he did not anticipate that this would be found necessary. The Company already had the right to charge a higher rate in certain parts of their area than in others; but they had never done so.

Mr. COURTHOPE MUNROE cross-examined for the Liverpool Corporation. The proposition was put that the change in the value of the gas as proposed in the Bill would be to reduce the value in the flat-flame burner to between 2 and 3 candle power. Witness, however, said this was not so, and he would not suggest doing any such thing. He would not agree that Liverpool was very peculiarly placed as regards the number of flat-flame burners. To emphasize his point, Counsel put the following figures, obtained as the result of inspections by Corporation officials: From Jan. 7 to 14 and Feb. 26 to March 12 this year, 15,353 houses had been inspected, and the results showed that there were 9337 flat-flame burners in use, 2001 fishtail burners, and 20,818 incandescent. These figures were very different from a 5 per cent. proportion of flat-flame burners as in the case of the Gas Light and Coke Company.

Witness said the number of burners existing was no guide as to the amount of gas burned through them.

Mr. HONORATUS LLOYD: We have followed the Corporation officials round, and can show that this is so. We have a witness coming to deal specially with this.

In further cross-examination, witness said the experience in Liverpool was that the poorer consumers provided themselves with incandescent burners.

Mr. MUNROE, on this point, said a census had also been taken of the Corporation tenements, which might be expected to contain many poor people. The result showed that in February this year there were in use 2469 incandescent burners and 931 flat-flame burners. Similar inspections of workshops showed 824 flame-flame burners and 219 incandescents. In warehouses, there were 293 flat-flames, 47 fishtail burners, and only 27 incandescents.

Witness said he did not accept these figures.

Mr. MUNROE next referred to the effect of the lower value gas upon the gas-engines of the Mersey Dock and Harbour Board, and suggested they would require more gas to get the same efficiency. Witness contended that the cheaper quality gas would be supplied at a cheaper price. Although more might be taken, the cost to the consumer would be less. There was no intention to make the Dock Board pay more—nor, indeed, any gas consumer. Counsel, however, desired some reduction in the price now charged to be included in the Bill. Reference was next made to the proposal to free the Company from the sulphur restrictions, owing to the inconvenience arising from the use of the lime process. It was put to witness that there was now a process for cleaning gas which did not involve the production of spent lime; and he replied that if such a system was available, and was not excessive in cost, he would advise his Board to accept it. It was all a question of cost.

Replying to Mr. JEEVES for the Bootle Corporation, witness said there were differences of opinion on the Board as to the advisability of applying the sliding-scale to the Company.

The CHAIRMAN remarked that he did not think it fair to press witness for his personal opinion.

Lord GORELL: Would you agree that the differential price in the additional area should automatically expire?

Witness said the Company desired to have it to guard against contingencies, and pointed to the fact that it had not been put into force in other districts as evidence that the Company acted fairly by their consumers.

Mr. *Edward Allen*, the Engineer and Manager of the Liverpool Gas Company, said gas was now being supplied to tenants in the proposed new area through landlords' meters placed in the Company's present area. The landlords were only awaiting the granting of supply powers to the Company for the latter to take over the supply in the ordinary way. It was the usual thing to have a differential to begin with in added areas.

The CHAIRMAN: It is more than a differential to begin with. It is a permanent differential.

Witness agreed, but pointed out that in other cases the Company had dispensed with it after a certain number of years. Dealing with the £1,000,000 additional capital, he remarked that during the past three years the increase in the Company's business had been at the rate of 5·83 per cent. per annum. Taking a 5 per cent. increase, a total of £1,013,913 would be required within the next ten years. He reiterated Counsel's opening statement regarding the circumstances of the change of burner in Liverpool, and added that, whereas the change was expected to make a difference of 2-candle power in the flat-flame burner, the actual difference had turned out to be 3¾-candle power. Since then there had been a call for a cheaper gas. But Liverpool had been isolated in the matter of candle power; whereas it was now the general opinion in the gas industry that there should be a uniform quality all over the country. Since 1910 there had been great advances in gas fires and radiators; the object being to secure the greatest amount of radiant heat. Thus the tendency had been toward designing apparatus for a lower quality gas than was supplied in Liverpool, with the result that there had been considerable retardation of development in gas-stoves, &c. What this development might have been was shown by the fact that, notwithstanding the hindrance mentioned, there had been fitted during the past two years 7182 gas-fires on the simple hire system. This was small compared with what he hoped to do if the Bill were passed. A 14-candle power gas would give about 540 B.Th.U.; and this was what the Company were asking for. As to the relief from sulphur restrictions, it was a matter of simple justice that the Company should be treated in the same way as all other gas undertakings. Even the Health Committee of the Bootle Corporation had expressed the opinion that it would not be long before the Company was relieved from the use of the lime process. As an instance of the unsuitability of the Liverpool gas for modern conditions, witness mentioned the Liverpool gas exhibition, when a contract was entered into with the makers of a particular type of burner which was guaranteed to give 60-candle power per foot with gas at 3 cubic feet per hour. The lamps, however, turned out to be an absolute failure. The makers suggested mixing air with the gas; and it was found that the addition of 22 per cent. of air gave complete success. The gas was too rich for the burners; and the same criticism applied to a large number of modern burners, the use of which was precluded under the conditions obtaining in Liverpool to-day. Furthermore, the manufacture of this rich gas involved the use of cannel coal, which was now very difficult to get—in fact, last year a full supply could not be obtained. Again, the use of this coal, which did not have a low ash content, precluded any possibility of a market in coke, for which there was a great field in Liverpool. With cannel coal the Company were forced to keep to horizontal retorts, because of the low illuminating power of the gas manufactured in vertical retorts. The Mersey Dock Board were quite under a misapprehension when they alleged that the new form of gas would not be suitable for their gas-engines, or that it would cost more. During the time of the coal strike of 1912, the Company, by arrangement with the Liverpool Corporation, reduced the candle power of the gas to about 13 candles and the calorific value to 520 B.Th.U. In spite of this, the Gas Company's own gas-engines worked perfectly satisfactorily; and so far as he was aware, the Dock Board's engines also worked well, because there had never been any complaints.

The CHAIRMAN: But they used more gas?

Witness: I presume they used more gas. I can certainly say they would use more.

Suppose you reduce your value by 15 units, can you tell us the corresponding increase in the amount of gas used in a gas-engine for the same work?—No; but it would not be a very great increase.

You may get better work; but how much more would it require for the same purpose?—Less than in proportion to the calorific value.

In concluding his evidence-in-chief, witness referred to the great number of other large cities where lower candle power than that at Liverpool was supplied. The standard in Edinburgh was at one time 25-candle power; whereas it was now 14 candles.

Mr. JEEVES, for the Bootle Corporation, opened the cross-examination. Witness said that a figure of 620 B.Th.U. with a 20-candle power gas was too high. Recent tests showed the thermal value to be lower. A question was raised as to the position of flat-flame burners in workshops, where for the lighting of tools incandescents were found useless. Witness said that a great many cases of this sort had been referred to him, and he had been able to devise satisfactory lighting, and dispense with the flat-flame burners. He admitted that in certain shops the flat-flame burner was best. In that case, said Counsel, a certain illuminating value should be retained. Witness would not pledge himself to replace all flat-flame burners with incandescent ones. The experience was that the poor man did change his burners, knowing that he was repaid at once. It was the rich man, with electric light and a few flat-flame burners, who was indifferent to making a change.

Mr. JEEVES: You will be able to make gas cheaper?

Witness: Yes.

And that ought to be accompanied by some reduction in price?—If your Corporation will guarantee that the price of coal will be reduced, I will make that promise.

The CHAIRMAN: As a matter of fact, we understand if there is economy in production it immediately affects the price of gas?

Mr. JEEVES: Not necessarily. It is entirely in the hands of the Company.

Mr. COURTHOPE MUNROE, for the Liverpool Corporation: We also dispute that proposition.

The CHAIRMAN: Is there not some statutory obligation on the Company?

Witness: There is an audit, at the instance of the Recorder, which makes it impossible to withstand a reduction in price when the accounts show it is possible.

Mr. JEEVES: There should be some statutory provision to ensure good management.

As in the case of the last witness, Mr. Allen did not desire to express his personal opinion on the question of applying the sliding-scale to the Company. All he could say was that the Board were against it.

Mr. COURTHOPE MUNROE then took up the cross-examination on behalf of the Liverpool Corporation. He said he agreed the illuminating power at present in force in Liverpool should go; but he was anxious that the minimum calorific power should be maintained at a sufficiently high level. His next point was that a reduction in price should accompany a reduction in candle power. He suggested that the gas bill of the Mersey Dock Board would be increased by £5000 per annum. This proposition was not assented to by witness, who, however, agreed that there might be a slight increase in the amount required to give the same light in an incandescent burner. But with gas-engines, if the price was reduced, as would follow these proposals, then the bill would be less. As a matter of experiment, witness had shown that with 620 B.Th.U. gas and 563·1 B.Th.U. gas, with a consumption of 2·9 feet per hour, practically the same light was given—57·7, as against 58. The actual figures of the numbers of flat-flame burners in use told nothing. He maintained they were misleading, and insisted that the amount of gas used in flat flame burners in Liverpool was not 5 per cent. of the total sold. Counsel next referred to a paper witness read at Manchester in 1906, in which he expressed sentiments entirely different from those put before the Committee. Witness replied that he had learned something since then.

Mr. MUNROE: What is your reason for asking relief from sulphur restrictions?

Witness: We stand alone at present.

That is your only reason?—Yes. I am considering a scheme for dealing with the sulphur impurities now; and I should certainly recommend the Board to adopt any improved method of manufacturing gas.

In re-examination, witness, on the question of reducing the price of gas to the consumers, said that, under the provisions of the Gas-Works Clauses Act, the Company could be compelled to reduce the price; and this provision had been acted upon year after year.

The CHAIRMAN: There have been petitions?

Witness: Yes. Two particular persons appear year after year as a matter of course, and an accountant, who is an entirely independent person, is appointed.

In answer to further questions, witness said the accountant went very carefully into the accounts, and every year so far he had been satisfied that the allocation as between revenue and capital had been correct. When the profits got to more than the Company required for the ordinary needs of the business, there was nothing to do, as a maximum price Company, but to reduce the price of gas to the consumer. At the present moment, the actual selling price of gas was 2d. per 1000 cubic feet less than the cost of manufacture. There must be an increase to 2s. 3d. unless the Bill passed.

The CHAIRMAN: And yet you pay full dividends?

Witness: We had to draw on our reserve last year to do it.

Under further re-examination, witness said that he represented the opinions of gas engineers generally when he asked for gas of a uniform quality all over the country. Liverpool was now a fallow field in respect of stoves, fires, &c.; but he expected great fertility if he could make gas of a quality which would suit the stoves now on the market. It would be a great disadvantage to Liverpool if special stoves and fires had to be made to suit their gas—indeed, he doubted whether it would be done, and thus little progress would be made.

Mr. TALBOT, for the Liverpool Corporation, on the question of sulphur removal, interposed that Mr. Charles Carpenter, of the South Metropolitan Gas Company, had invented a process in which the use of lime was unnecessary.

Witness said he had inspected the plant at the South Metropolitan Company's works; and his Directors were considering the matter. It was a question of whether anything could be done without injuring the gas, and whether it was too costly, or involved anything which it would be impossible to do at the Liverpool works. The system had not been adopted elsewhere than at the South Metropolitan works.

Mr. TALBOT: And the result is that the South Metropolitan percentage of sulphur is within a very small fraction of half that of the other two London Companies.

Mr. VESEY KNOX, for the promoters, said he did not think there was much between the Company and the Corporation on this matter. The Company were quite willing to be in the same position as the South Metropolitan Company—*i.e.*, be relieved of the restriction and take all possible precautions.

The CHAIRMAN: Mr. Allen says they are willing to carry out this process if they think it is satisfactory.

Mr. VESEY KNOX: We would undertake to do it if we found the process was a success and the cost was not excessive.

The CHAIRMAN: Do you propose to put it as a statutory obligation.

Mr. VESEY KNOX: No. We ask to be free from sulphur restrictions the same as the South Metropolitan Company, and then we would use the best method of manufacture—either Mr. Carpenter's or anybody else's.

The CHAIRMAN: I do not think it would be possible to bind the Company down by Statute to carry out this method, which is comparatively new. I cannot put this test in the Bill; and I think there should be some way of getting over it.

Mr. TALBOT: We are confident that this is recognized by gas engineers as a sound thing. If the Company will come under an obligation to use their best endeavours to devise some suitable method to reduce the sulphur contents, I think we should not ask anything beyond that. In the circumstance that they are actually getting rid of restrictions, it would not be unreasonable to put that in the Bill.

Mr. VESEY KNOX: I do not think it ought to be, as we are not a sliding-scale Company, and it can mean nothing.

The CHAIRMAN: Your object would be to give the highest number of British thermal units. I suppose you have reckoned out what calorific standard you can work to?

Mr. VESEY KNOX: I am of opinion that we should have the same figure as the Gas Light and Coke Company.

The CHAIRMAN: But what figure would you work to?

Witness: At about 540; but I should like to have a margin below.

How low do you expect to fall at times?—About 520. We have varied as much as 100; but that is exceptional, and is due to our endeavours to keep up to the high candle power.

A discussion then took place between the Chairman and witness as to a proper figure for a standard price under the sliding-scale. It was agreed that, with 2s. 1d. as the selling price, a proper standard price would be 2s. 4d. in the case of the Liverpool Company. The Chairman's point of view was that a company might have more inducement to economy under the sliding-scale, with which witness agreed, but added that the sliding-scale could not bring about more economical conditions than existed at Liverpool.

The CHAIRMAN: But, for the sake of uniformity in the gas industry, there may be an advantage in having a standard price in all cases?

Witness: It has been considered so.

Sir *Corbet Woodall*, the Governor of the Gas Light and Coke Company, said he saw no good reason why the Liverpool consumer should have a gas different from that of the London consumer. As to the sulphur compounds, practically every large gas company had been engaged in experiments with a view to reducing the sulphur contents. With regard to the minimum pressure of 8-10ths proposed in the Bill, this was the Model Clause; but he was of opinion that something more than this was now required. He suggested 12-10ths at the works, in order that the consumer might be sure of a proper pressure at his burner.

The cross-examination of witness was not lengthy. Mr. TALBOT, for the Liverpool Corporation, pointed out that the Gas Light and Coke Company's calorific standard had been fixed at what the Company were working up to now. The Liverpool Company's standard was very much higher.

Mr. JEEVES, on the question of pressure, mentioned that a House of Commons Committee had before them, a few moments ago, a case in which 20-10ths had been allowed after Sir Corbet Woodall had given evidence before the Committee. It was, however, pointed out by witness that too high a pressure meant that more gas would be consumed unless means were taken to check the pressure.

In answer to Lord GORELL, on the question of sliding-scale, witness said he should be sorry to express any opinion contrary to that held by the Directors of the Company. At the same time he saw nothing to distinguish Liverpool from the other great towns in the kingdom where the sliding-scale exists.

Mr. *A. Edwards*, who has charge of the automatic meter rentals and the supervision of the automatic meter inspectors and collectors, handed in a table giving particulars of a house-to-house inspection carried out by himself and his staff with a view to ascertain the exact facts relating to flat-flame burners. No less than 5696 visits were paid; and the figures so obtained showed that there were in Liverpool 190 flat-flame burners in temporary use, 2144 little used, and only 375 in general use. In most cases, the parlour contained a three-light chandelier. In this one of the burners had been converted to an incandescent; the other two flat-flame burners being allowed to remain, but were never used. For this reason, the mere number of burners in existence was misleading.

These figures were disputed in cross-examination as indicated already during the evidence of other witnesses.

Mr. *E. H. Stevenson* also generally supported the Bill. The capital of the Company per million was very small, and must have included some expenditure out of revenue.

Mr. MUNROE said this was the very contention of the Liverpool Corporation—that instead of the economies going to the consumer, they were utilized in capital expenditure.

Witness said the benefit of capital expenditure out of revenue went to the consumer all the same eventually.

Continuing upon the general provisions of the Bill, witness said he did not believe the capital asked for would last the Company for twelve years. He agreed with previous evidence as to the reduction in illuminating power and the substitution of the calorific value test, and mentioned that Wigan was the only other gas undertaking which was under obligation to sell high candle power gas. As that was a Corporation, however, he doubted whether this was actually supplied. On the question of pressure, he had always advocated this, and was in favour of 20-10ths, on the ground that to supply a pressure that was of no use to the consumer was an absurdity. The 8 10ths was instituted in the old days when gas was used in an illuminating flame. He considered it would be better for the Company to come under the sliding-scale. Last year, the cost of manufacture was 2s. 3·8d.; and taking account of the economies likely to accrue under the Bill, a fair standard price would be 2s. 4d., if it were to be a single standard, or with a neutral zone of 2d. down to 2s. 2d. as an alternative.

Answering Mr. MUNROE, for the Liverpool Corporation, witness said he was in favour of one calorific standard throughout the kingdom. With regard to the proposal to take in the Seaforth Rural District, Counsel suggested that this would block the natural expansion of the Corporation gas undertaking in Fazakerley, and that it should be incumbent upon the Company to purchase the Corporation's undertaking. Witness said this would be by far the best thing, and suggested purchase on the basis of paying off the debt. This was not, however, assented to as a basis of purchase by Counsel for the Corporation. He put the saving in reducing the calorific value to 540 B.Th.U. at about 2¼d. per 1000 cubic feet.

In reply to Mr. JEEVES, witness said he would prefer a fixed standard price of 2s. 3d. rather than a neutral zone.

In re-examination, witness pointed out that the new capital powers included £100,000 over-spent on capital account; and looking to

future extensions, a lower figure than £600 per million should not be taken.

Mr. *Samuel Glover*, the General Manager of the St. Helens Corporation gas undertaking, said it was common knowledge in the industry that the restrictions under which the Liverpool Company worked had retarded their progress for many years. He could give no reason why they should be treated in an exceptional manner. St. Helens had 14-candle power gas, and all the consumers were satisfied. On the question of pressure, his opinion was that 20-10ths would be abnormal. Even if it were put upon the Company, there should be no penalty about 8-10ths. The Liverpool Company's works were a model of engineering and management.

Mr. BALFOUR BROWNE, for the Liverpool Corporation, put it to witness that if gas at 620 B.Th.U. represented 2s. 1d. per 1000 cubic feet (the present selling price), then at 540 the selling price should be 1s. 9·7d.

The CHAIRMAN: It has already been put in evidence and not contradicted, that the actual cost of the production at the moment is much greater than the selling price. That has a bearing on the argument.

Mr. JEEVES, for Bootle, referred to the Glover-West vertical retorts, and suggested that these never gave gas of a lower value than 500 B.Th.U. He asked if, using these retorts and the same coal as that carbonized at St. Helens, the Liverpool Company could not effect a reduction in price of 4d. per 1000 cubic feet.

Witness said he would not go beyond 2d.

In reply to Lord GORELL, witness suggested that 500 B.Th.U. would be about the right figure, with a small margin.

The CHAIRMAN at this point made the following statement: It seems that we have got to such a stage now where it might be worth while to indicate something of what is in the Committee's mind, because that may shorten matters considerably. You are asking Parliament to do away with the illumination test; and I understand that will not be objected to. You are asking for a calorific standard. This is not objected to on principle; but the actual rate has still to be fixed. My impression is—I have not consulted the Committee—that the rate will certainly not be lower than we have fixed in another case; but it is possible that the percentage might be altered. Then, with regard to the matter of price, there seems to be rather a general opinion, even among your own witnesses, that a standard price and sliding-scale could be fixed without disadvantage to the Company and with possible advantage to the consumer, and, for my own part, I am certainly in favour of adopting the sliding-scale for the purposes of uniformity in the industry. I should think it would not be very difficult to arrange with some of your opponents as to the actual figure at which the standard price should be fixed. These, I think, are really the main points at issue; and it seems to me that you are so very close that we might get a settlement without much further evidence. There are some minor points—such as purification, the differential, and the pressure at the works—which might very easily be settled; but on the main points it might be possible for you by discussion to come to some decision in view of what I have said on behalf of the Committee.

Tuesday, May 5.

Mr. BALFOUR BROWNE, representing the Liverpool Corporation, said: Your Lordship was good enough to throw out a hint last night; and I believe your suggestion has been acted upon. As far as the Corporation are concerned, we had a consultation to-day, and then my clients left me to see the promoters; and I believe that a settlement has been come to. I have not seen my clients; but I am perfectly willing to take it from the Agent for the promoters that a settlement has been come to, and believe in ten minutes the whole matter will be in writing.

Mr. SEDGWICK (Messrs. Rees and Frere) said the parties had settled the standard price and the calorific value; and there were one or two minor points involving consequential alterations in the Bill which would soon be agreed, if the Committee would allow them to stand over for a while.

Mr. HONORATUS LLOYD said no question arose on the financial clauses.

Mr. FORBES LANKESTER said certain clauses for the protection of the main roads had been agreed between the parties; but there was a dispute as to county bridges. In Lancashire, the County Council were not the actual road authority, but were the paying authority in respect to maintenance of the roads; and in these circumstances he had been able to agree with the Company that the expense of altering pipes due to repairs to, or reconstruction of, main roads should be borne by the Council. With regard to bridges, however, the position was somewhat different, because the Council were the absolute owners of the bridges; and here it was contended that, as the Company already had mains on the bridges, when any disturbance of them became necessary, owing to the exigencies of traffic, which was becoming a very serious matter in view of modern methods of traction, the Company should pay the cost of removing or altering the position of the mains. He was not asking for any new legislation at all, but for what had been granted before so far as bridges were concerned. As a matter of fact, in regard to electric lighting cables, the principle was admitted both as to main roads and bridges, notwithstanding that in the Electric Lighting Clauses Act there was no express provision to this effect. So far as the gas industry were concerned, there was the case of 1909 always quoted in these circumstances—viz., Eastbourne—in which what he was now asking was given by a Committee after a fight, as regarded bridges. In that case, also, the same provision was granted with regard to main roads. The principle was implied in the Gas-Works Clauses Act, because section 6 contained words to the effect that the undertakers should indemnify the road authority for any expense they might be put to in consequence of the first laying down of mains; and this should be extended to removing and relaying.

Mr. HONORATUS LLOYD said the point was a small one on the face of it, but was rather important. It was curious that, whereas it was common ground between the parties that where the road authority desired to alter the position of a gas-pipe in a main road, the road authority should pay the cost, yet when it came to bridges it was suggested that the principle should be changed. It was a little difficult to see the distinction. Under the Eastbourne Act of 1909, the difficulty arose in a somewhat extraordinary way. The London, Brighton, and South Coast Railway Company said that as the Gas Company had mains over the Railway Company's private bridges, the Gas Company should bear the cost of altering the mains when the Railway Company found it necessary to reconstruct the bridges. This was agreed; and, in addition, the Gas Company, for reasons which he could never quite understand, applied the same principle to the County Council, both as to main roads and bridges. Since that time some small gas companies, who would give up principle to save cost, had agreed to similar requests; but whenever there had been a company of sufficient stability to fight the thing, Parliament had always decided the other way. There was the Tamworth Gas Act of 1911, the Woking Gas Act, 1912, and the Kidsgrove Gas Bill of the present year, in all of which similar requests had been refused after a fight.

The CHAIRMAN said the Committee did not think the proposal of the County Council should be adopted.

Mr. HONORATUS LLOYD thanked the Chairman, on behalf of the Company, for throwing out the suggestion on the previous day which had led to the agreement being come to.

Mr. SEDGWICK said he would bring up the exact clauses to-morrow. He could say, however, that with regard to the calorific value test, the agreement was to insert 550 B.Th.U., with a margin of 5 per cent. A standard price of 2s. 1d. per 1000 cubic feet had been agreed, with a neutral zone up to 2s. 4d.; while the differential in the added areas was not to continue, if put into force, after ten years.

The CHAIRMAN remarked that, though the illumination test was to come out of the Bill for purposes of penalty, the Committee desired it to remain in for purposes of information, on the lines of the Gas Light and Coke Company's Bill.

Mr. JACQUES ABADY said he took it that the present condition of things would remain. The testing-station of the Company was not used, by arrangement with the Corporation, who had a portable testing instrument which was their own property. He understood it was with this that flame-flame burner tests would be taken.

The CHAIRMAN: The present conditions remain, and there is to be no penalty.

Wednesday, May 6.

The clauses were formally approved this morning, on the terms indicated the previous day; and the Bill was sent for third reading.

SOUTH SUBURBAN GAS COMPANY'S BILL.

THE CHEMICAL CLAUSE AGAIN.

HOUSE OF COMMONS COMMITTEE.—Monday, May 4.

(*Before Sir* HARRY SAMUEL, *Chairman, Mr.* FRANCE, *Mr.* ORDE-POWLETT, *and Mr.* ROBINSON.)

This Bill is to enable the South Suburban Gas Company to acquire lands and construct works at Erith, and to deal in residual products.

Mr. HONORATUS LLOYD, K.C., Mr. VESEY KNOX, K.C., Mr. W. J. JEEVES, and Mr. BORASTON appeared for the promoters. The United Alkali Manufacturers' Association, who were the only opponents, were represented by Mr. J. D. FITZGERALD, K.C., and Mr. LYNDEN MACASSEY, K.C.

Mr. HONORATUS LLOYD, in opening the case for the promoters, said that the South Suburban Gas Company was amalgamated a short time ago with the West Kent Gas Company, and in doing so they obtained easy access to the River Thames, which was a very valuable asset. Some gentlemen had bought a piece of land in the hope of obtaining sanction from Parliament to hand it over to the Company for the purpose of constructing works, which included a wharf and jetty on the Thames and also a railway line to the South-Eastern and Chatham Railway. Clause 36 of the Bill enabled them to dispose of the existing works in Erith. Clause 41 repealed section 73 of the Company's Act of 1912 referring to the purchase of materials by the South Suburban Company, and gave powers to deal in residual products; but the Alkali Manufacturers' Association had objected, and the clause had been struck out. They had, however, made an addition to clause 37; the new portion being sub-section (2). The question of residual products had been considered by a Joint Committee of both Houses of Parliament in 1912, and in their report were, among others, the following four important recommendations:

(9) It was admitted by the chemical manufacturers that gas undertakings should be allowed to work up their own residuals, and to buy—whether from other gas undertakings or elsewhere—the materials required to work-up such residuals; and the Committee support this.

(10) They consider further that one gas undertaking should be allowed to purchase the residuals of other gas undertakings, in order to manufacture other products of the same kind as the purchasing undertaking is manufacturing from its own residuals; but this is subject to the qualification contained in paragraph 12.

(11) They further consider that gas undertakings should, in addition to buying residuals from other gas undertakings, be authorized to buy, from gas undertakings or elsewhere, the materials required to work-up the purchased residuals.

(12) They consider, however, that gas undertakings should not be allowed to manufacture chemicals exclusively from raw materials bought from sources other than gas undertakings, or in the manufacture of which the use of residuals produced by themselves or bought from other gas undertakings is merely subsidiary.

Continuing, Counsel said that the position now was that, so far as the present works were concerned, the first section of clause 37 would stand; but they were asking for power to set up works on the new

land, with the powers recommended by the Joint Committee on residual products set out above. Therefore it was a matter of discussion as to whether these recommendations of the Joint Committee should be adopted at all.

Mr. *Charles Hunt*, the Chairman of the South Suburban Gas Company, said that sub-clause (*b*) of clause 37 translated section 9 of the Joint Committee's report. Section 10 of the report was embodied in sub-clause (*c*), and section 11 in sub-clause (*d*). Clause 37 therefore complied with the recommendations of the Joint Committee; and the Company were only asking the present Committee to put into operation the recommendations of the Committee especially appointed to consider this matter as a general question.

Some discussion then took place between Mr. VESEY KNOX and the CHAIRMAN as to whether the Joint Committee's decision should be inserted in the Bill; Counsel pointing out that the intention of the Joint Committee was to go specially into this question, and that their decision should be followed in the Model Bill. The Chairman, however, insisted that a Committee considering a Private Bill should have full power to express their own opinion in this matter as special circumstances might arise.

Mr. MACASSEY, in cross-examination on behalf of the Alkali Association, pointed out that there was nothing in the Joint Committee's report which stated that a Select Committee considering Private Bills should not consider them on their own special circumstances, and there was also nothing which said that if a Company on whom a restricted provision had been passed asked for repeal, that provision should be repealed. This being so, he asked witness in what single instance had the circumstances of the South Suburban Company altered since the date at which section 73 of the Act of 1912 was imposed.

Witness said they had altered in the respect that the land now being sought was better situated for carrying on the works of the Company than the site at Sydenham.

Mr. MACASSEY then gave figures to show that, although the South Suburban Company did not at present go in for the same amount of business as regards residuals as the Gas Light and Coke and the South Metropolitan Gas Companies, yet they made better profits. For instance, the figure of the South Suburban Company for tar and ammonia produced per ton of coal in 1912 was 4s. 7d., as against 4s. 2d. in the case of the Gas Light and Coke Company, and 4s. 3½d. for the South Metropolitan Company.

Witness remarked that with the new land the South Suburban Company would be able to buy residual products from smaller companies on the river in order to work them up.

In re-examination by Mr. VESEY KNOX, witness said that at Sydenham the works were surrounded by residential properties, and it was not a suitable place for carrying on the residuals business. So far as the manufacture of the oxide and sulphuric acid was concerned, and so far as the distillation of tar was concerned, they did not do it themselves at the present works on account of the situation. The work was done by the South Metropolitan Company, who purchased the materials from them; and it was the object of the Company, if not hampered, to do for themselves what had now to be done by the South Metropolitan Company.

The CHAIRMAN asked what proportion the sale of residuals would bear to the general profits on the gas undertaking.

Witness said that the profits for the last half year from residuals were £19,000, as against £50,000 general profits for the same period.

The CHAIRMAN suggested that, if the Company had unlimited powers with respect to the purchase and working-up of residuals, they could get more out of residuals than out of the ordinary gas business.

Witness did not agree with this.

Mr. MACASSEY said that the Company were seeking powers which would enable them to do this.

Witness pointed out that the sum of £19,000 given in answer to the Chairman represented the working-up of the Company's own residual products. But if the powers sought by the Company were granted, the raw materials would have to be bought; and this would very much diminish the gross profits.

Mr. ORDE-POWLETT (a member of the Committee) asked whether parliamentary powers would not give the Company a preference over competing chemical manufacturers.

Witness replied that he did not think so.

The CHAIRMAN said that what the Committee would like to know was whether, on the other hand, the petitioners had any special evidence to put before the Committee to prove that there was a special advantage to this Company in competition with manufacturers outside. If there was no such evidence, then the Committee would feel that they would follow the report of the Joint Committee.

Mr. VESEY KNOX said that, in view of the Chairman's remarks, he would close the case for the promoters.

Tuesday, May 5.

When the Committee sat this morning, evidence was heard in opposition.

Mr. *W. Pearce, M.P.*, a Director of two chemical companies on the Thames, said that in the Bill advantages were given to the Gas Company by reason of their special powers for gas purposes. In the first place, they were in an advantageous position with regard to raising capital, and, secondly, they obtained from gas-making operations a quantity of raw material, and therefore did not have to purchase it in the open market, as the chemical manufacturer did, at market prices. With regard to the former, the statutory dividend of the Company was secured by the fact that they were allowed to charge a price for gas which would meet this. In the case of this Company the standard price was 2s. 9d.; but the actual charge was 2s. 4d. He contended that the South Suburban Company were likely to do better in not undertaking to deal with residuals on a large scale, as the figures had shown. With regard to the smaller companies being able to sell their residuals to the South Suburban Company for the purpose of working up, already two large London companies catered for these, so that they were amply protected. The chemical trade would look upon it as an additional hardship that a third company should be authorized to purchase raw materials from the small companies. Turning to the alleged advantages of a gas company over chemical manufacturers in this business, witness said that, if a gas company made a loss on the working of residuals, that loss would be charged upon the gas consumers more than upon the shareholders in the Company. He therefore claimed that gas undertakers should show in separate accounts the results of their trading and the manufacture and sale of residual products.

In cross-examination by Mr. VESEY KNOX, for the promoters, witness said that the chemical manufacturers were attempting to get an absolute restriction on every gas company in purchasing residuals, but not with regard to working up their own residuals. This was the only Gas Bill the chemical manufacturers had opposed since the Joint Committee's report—though they were free to oppose every Gas Bill—in order to show that there were special circumstances, and ask that the Joint Committee's report should not be carried out. Counsel said that in that case the Joint Committee were of no use. He thought the Joint Committee were appointed to settle the question once for all. Witness accepted this; but considered that the chemical manufacturers had a right to appeal against an exceptional Bill, and that the Committee had a right to repeal the decision of the Joint Committee in this special case. Counsel, however, was of opinion that the chemical manufacturers wanted the South Suburban Company put under a restriction from which most companies were free. With regard to the powers for purchasing raw materials possessed by the South Metropolitan Company, which the chemical manufacturers objected to, Counsel pointed out that this Company only bought one-tenth of the total quantity of residuals which they worked up; the remaining nine-tenths being that produced by their own gas-making operations. It was suggested by Counsel that the chemical trade knew the markets better, and that they had the advantage over gas companies for this reason. Witness, however, held the view that a gas company got a natural preference when dealing with other gas companies. If the manufacturers obtained the powers for which they asked, said Counsel, they would be the only possible purchasers from small gas companies.

Mr. MACASSEY, addressing the Committee on behalf of the chemical manufacturers, said the two points raised by them were: First, they asked that the extended powers of manufacturing residual products which the Company now sought to exercise on additional lands should not be granted, and, secondly, that whatever the decision of the Committee might be, a clause should be inserted in the Bill providing that the Gas Company should keep accounts showing the results of their trading in residual products and the ordinary commercial basis of the gas undertaking. The clause which the Company now asked to be repealed had been inserted by Lord Ritchie's Committee after careful inquiry into the special circumstances of the Company and the preferential position occupied by a gas company against a chemical trader in the manufacture of residual products; and he (Counsel) maintained that a gas company did hold a position of extreme advantage. As the result of the exercise of a statutory monopoly of the supply of gas, the Company were in possession, as a waste product, of a raw material for chemical manufacture. The chemical manufacturer, on the other hand, had to buy precisely the same material in the open market at market prices. Again, the ordinary trader had to raise his capital on the security of the profit and loss of his business; and if business went against him, he had to go to the wall. The Gas Company, however, raised their capital on the security of a price which they were authorized by Parliament to charge to the consumers of gas; and if the residual side of the business went against them, they could put a very large part of the loss on the back of the gas consumer.

The CHAIRMAN asked what the decision of Lord Ritchie's Committee was.

Mr. MACASSEY said the decision was that the Company should not be allowed to purchase materials other than those required for the manufacture and supply of gas, and for the purpose of working up their own residual products; and a clause was inserted to this effect. Continuing, Counsel said that the Alkali Manufacturers' Association had successfully opposed a large number of Bills, and Committees of both Houses had inserted clauses in Gas Acts similar to the clause which the South Suburban Company now sought to repeal. The Association were seeking to make it obligatory, by means of an alteration in the Model Bill and by means of an alteration in Standing Orders, to have this general embargo imposed on all gas companies—*i.e.*, that by Standing Orders gas companies should be prohibited from going beyond the business of manufacturing their own residual products. Counsel also claimed that the intention of the Joint Committee's report was that all cases which came before Select Committees were to be considered on their merits, and that no Committee should be fettered by the report.

The CHAIRMAN asked whether any fresh powers had been granted to the other two large London Gas Companies—the Gas Light and Coke and the South Metropolitan—since the report was issued.

Mr. MACASSEY replied in the negative. Continuing, he said that, with regard to the evidence given by the promoters as to benefiting the small gas companies on the Thames by enabling them to sell their residual products to the Company, not a single representative of these small companies had given evidence. Coming back to the question of separate accounts, Counsel said it would be convenient for the consumers of the Company and everybody else to be able to see the true position with regard to this trading.

The CHAIRMAN suggested that it would be necessary to know the price paid for raw material to make this valuable.

Mr. MACASSEY said he did not want this, so long as he knew the actual position of the residuals undertaking.

Mr. VESEY KNOX pointed out that the Gas-Works Clauses Act, 1871, prescribed the form of accounts which were to show the net receipts after having deducted labour and cartage; and if Mr. Macassey was going to alter the Gas-Works Clauses Act, it was rather a serious undertaking.

Mr. MACASSEY said he did not want to alter the form of accounts, but thought the item of residuals should be shown in the statutory form.

Mr. VESEY KNOX then replied on behalf of the promoters, and again pointed out that this matter had been referred to a special tribunal to

consider, at the request of the gas companies and with the concurrence of the alkali manufacturers; and unless new facts had arisen, it would be most unfortunate if the decision of the Joint Committee was not followed. It would be harsh on this Company if they should not have the same liberty in this matter which the Joint Committee had reported ought to be given to other companies. He also pointed out that this was the first case in which it was sought to differ from the report since it was issued; the chemical manufacturers having up to now accepted the award. With regard to the small gas companies, there were about forty in Kent alone making tar; and very few had means of dehydrating it so as to make it suitable for use on roads. In fact, the Kent County Council had set up a small plant of their own for the purpose; and they had been threatened for doing an illegal act. The South Suburban Company would also be convenient for the small companies in respect of ammoniacal liquor, inasmuch as they might not have sulphate plants, and could dispose of it to the South Suburban Company to work up into sulphate of ammonia. Also, on the question of tar, the tar distillers failed to offer anything like a fair price to the small gas companies; but the South Suburban Company could bring the tar economically to their new works by water, and so offer a reasonable price and serve a useful public purpose. Giving evidence before the Joint Committee, Mr. Charles Carpenter, of the South Metropolitan Company, said that the Richmond Gas Company came to him to sell their residual products because they could not get a fair price from the manufacturers.

The Committee then deliberated in private. On the re-admission of the parties,

The CHAIRMAN said that the Committee had been very carefully into the whole of the case, and realized that the Joint Committee's report gave a certain amount of guidance; but at the same time they were of opinion that the decision was not very clear. It was their opinion that the preamble of this Bill was proved. With regard to the addition to clause 37, however, the Committee were of opinion that it was undesirable that gas companies should be allowed to undertake to any large extent a big competitive business with alkali manufacturers. Under these circumstances, they suggested that a new clause should be brought up by which the Company should be allowed to purchase up to 33 per cent. of their total output of residuals. They could not go further, having reference to the nature of the report that it is undesirable there should be exclusive manufacture by them.

In view of this decision, it was subsequently decided to add a proviso to sub-section (*c*) of clause 37, and to delete the remainder of the clause—viz., sub section (*d*) and the following paragraph. So that clause 37, as embodied in the Bill, reads as follows:—

(1) The Company may, upon the lands described in the section of this Act of which the marginal note is "Power to Acquire Additional Lands," or any part thereof, erect, maintain, alter, enlarge, renew, improve, and use gas-works, with all such erections and buildings as they may think fit, and may make and store gas, coke, tar, lime, ammoniacal liquor, and other residual products arising directly or indirectly from the manufacture of gas, and manufacture, convert, and otherwise deal in such products, and may do all such acts and things as they may consider necessary and proper for, or in connection with, the purposes aforesaid, or any of them.

(2) Notwithstanding anything contained in section 73 (as to purchase of materials by South Suburban Company) of the Act of 1912, the Company may at, or for use at, any works erected upon the said lands:

(*a*) Work-up and convert the residual products arising directly or indirectly from the manufacture of gas by them;

(*b*) Purchase, whether from other gas undertakers or elsewhere, and use the materials required to work up and convert such residual products;

(*c*) Purchase the residual products arising from the manufacture of gas by other gas undertakers, and therewith manufacture other products of the same kind as the Company are manufacturing from their own residuals products: *Provided that the quantity of any residual product so purchased by the Company in any year shall not exceed one-third of the quantity of the like residual product which shall in that year arise directly or indirectly from the manufacture of gas by them.* [The words in italics are the additions imposed by the Committee to the revised clause as submitted by the promoters.—ED. J.G.L.]

The CHAIRMAN, at the conclusion of the proceedings, informed the promoters that the Committee proposed to report to the House to the following effect:

That it would be advisable, in order to test the relative proportion of profits in gas undertakings from the supply of gas pure and simple, that the market price on the day of purchase of residuals from other gas undertakings should be inserted in the profit and loss account.

Mr. VESEY KNOX said he thought there would be a difficulty in this, as there was no market price for ammoniacal liquor—it varied at every place.

Mr. MACASSEY said that his learned friend was quite wrong in his contention.

The CHAIRMAN said that it would not hurt the promoters in this case, as it was not suggested that it should go into the Bill. If the House thought anything of the report it would act upon it, but if it did not, nothing would be done.

The Bill was then ordered to be reported for third reading.

PIPE PROTECTION.

A Clause in the Hull and Barnsley Railway Bill.

A pipe protection clause, similar to that which has been inserted in the Rhondda and North Eastern Railway Bills [*ante*, pp. 274, 360], appears in the Hull and Barnsley Railway Bill, which was sent forward for third reading by the Unopposed Committee of the House of Lords last Tuesday.

PIPE SUBWAYS IN THE NEW WESTERN ROAD.

The Bill promoting the new Western Road out of London, to be constructed by the Middlesex County Council at a cost of £502,809, three-quarters of which is to be borne by the Road Board, was last week before a Select Committee presided over by Colonel BATHURST.

Apart from the general opposition on details—there was really no preamble opposition—the Brentford Gas Company and the Metropolitan Water Board opposed with regard to the laying of gas and water mains. One of the chief advantages claimed for the road is that its construction will be such as to carry modern traffic, and that in consequence frequent breakings-up of the road surface would be undesirable. In this general proposition, of course, the gas and water authorities concur. The proposal of Mr. H. T. Wakelam, the Engineer to the Middlesex County Council, therefore was not to provide facilities for the laying of mains in the roadway but on the footpath, and to provide tunnels at crossings in order to allow the gas and water authorities to pass from one side of the road to the other. The Bill merely provides, however, that reasonable facilities shall be given. But something more specific was asked for by the gas and water authorities.

Mr. ERSKINE POLLOCK, K.C., for the Brentford Gas Company, cross-examining the County Council's Engineer, suggested the construction of a subway either down the centre of the roadway or separate smaller subways in the footpaths. The answer to this proposition was that it would entail an expenditure of £250,000, which, it was alleged, would be both prohibitive and unnecessary. On the other hand, nothing would be done by the County Council to prohibit the Gas Company carrying out their statutory obligations. All proper facilities would be given; but Counsel wished to know who was to determine the reasonableness of what the Council might suggest.

The CHAIRMAN said that surely this matter could be settled by agreement, or, failing agreement, by arbitration.

Mr. POLLOCK said a clause to this effect would satisfy him.

Mr. WROTTESLEY, for the Middlesex County Council, said that any clause submitted would be considered.

Mr. POLLOCK, on the question of subways, suggested that the policy of the London County Council in regard to Kingsway and the Embankment should be followed, and subways constructed under the new road. Witness, however, maintained that, for the size of pipes used by the Brentford Company, these were quite unnecessary. There was a difference of opinion as to the size of the pipes. Witness referred to 8-inch pipes; but counsel said that mains of 24 and 30 inches diameter would be necessary to supply the houses along the road.

Mr. WROTTESLEY thereupon asked whether the Company would be prepared to pay for the subway.

Mr. POLLOCK said that if a proper subway were constructed, the Company would not be unwilling to contribute towards it.

Witness, in answer to the CHAIRMAN, said his view was that, where the Company required a culvert or subway for their mains, they should provide it. The cost to the Council would be quite prohibitive.

The CHAIRMAN said the point in his mind was that those who used the subway should contribute towards its construction.

Another point raised by the Company was with regard to clause 7, which provides that any pipes found during the construction of the road should be appropriated by the County Council. The intention of this section, it was explained, was that such pipes would be relaid at the expense of the Council and to the satisfaction of the Company.

The CHAIRMAN, during the early discussion, while evidence for the Bill was being given, expressed the opinion that subways of some sort would be necessary in order to prevent the repeated opening-up of the footpaths or road.

The Metropolitan Water Board's case was that they would be willing to pay for any accommodation provided for their mains.

Evidence was called on behalf of the Brentford Gas Company.

Mr. *A. A. Johnston*, the Engineer and Manager of the Company, said he understood that, so far as existing pipes were concerned, the Middlesex County Council were willing to meet the Company; but they should be able to lay their future pipes across this road in order to fulfil their statutory obligations to the consumers, who were on both sides. The County Council said they were not to lay their pipes under the roadway without their consent, and also on payment of a certain sum of money. But it was pointed out that, under the general law, the Company were entitled to do this. Having regard to the County Council's conditions, therefore, he thought they should be allowed to lay pipes under the footway. A 30-inch main on either side of the road would be necessary; and they would require about 5 feet on each side for the accommodation of these.

In cross-examination by Mr. HONORATUS LLOYD, witness maintained that if the County Council took away the right which enabled the Company to carry their pipes across the road, they should make some corresponding provision. Subways for this purpose should be provided at certain points for future mains, although they did not exist to-day. The accommodation required for all the public services under the footway would be 24 feet on one side and 19 feet on the other; but the Company should not contribute to the cost of this accommodation beyond what they would have to pay as ratepayers.

Mr. HONORATUS LLOYD, K.C., said that this would make a total width of 43 feet for footpaths, which was rather considerable, and that the additional land required for widening would be a great expense. Counsel also suggested that if it was necessary for the public that there should be a greater width of footway, and since the Company would benefit also, they should be prepared to pay a fair cost; but witness would not consent to this. He added that in an ordinary road provision was made for mains; and if the new road was not constructed, some other road would in all probability be made. In answer to further questions, witness said the main running along this road would be used to supply the off-shoots from it. It would be fed from Heston, where there was a 26-inch main running from the Southall works of the Company; but an extra main would also be laid.

Sir *Corbet Woodall* said it would seriously interfere with the carrying on of the Gas Company if provisions were not made for them to lay mains along this road. The road ran between the two works of the

Company; and it was necessary for the mains to cross at several places. There should be a liberal margin left for the laying of the gas and water mains in order to avoid making themselves a nuisance to each other and to the neighbourhood. His suggestion was that an addition of 20 feet to the width of the road would remedy all the difficulties, and could be done at comparatively small cost. If subways were provided, it would be fair for the Company to pay a price for laying their mains, as they would save money on maintenance; but it was an entirely new proposition that they should pay to be able to put mains down along the road.

In answer to the CHAIRMAN, witness said that the difference in cost of buying the land and widening the road would be about £25,000; and he maintained that this would be a reasonable addition to provide for such a serious difficulty as this.

Mr. HONORATUS LLOYD, in cross-examination, said that the County Council were willing to provide accommodation for the existing mains. The Company, however, wanted accommodation for future mains; and if this was provided under existing circumstances, the Company would have to break up the road for the purpose of providing for them. He contended that if the Company wanted to provide for future mains they should pay for the provision.

Mr. POLLOCK, addressing the Committee on behalf of the Gas Company, said that whatever the Committee decided would be held as a precedent, as the position of the Brentford Gas Company differed from any other company, in that their sole interest was in this particular district. The Company were under statutory obligations to the people in this district; and it could not be said that they desired to use the road to carry large mains into another district. There were 21 roads supplied by the Company on either side of the new road, all of which would be interfered with for the purpose of laying pipes. The subways which must cross this new road, therefore, should be made big enough to carry future pipes as well as existing ones. A subway made a little larger so as to accommodate one large extra main in the future would probably meet with the requirements of the case. With regard to laying mains along the footpaths, the Government required 8 feet for telephones, &c., which only left 2 feet for gas and water mains. He therefore suggested that a width of 10 feet was not ample. If the lighting was to be done efficiently, they must have room to put the pipes. He therefore asked the Committee not only for the insertion of a clause securing that provision should be made for present pipes, but room to put future pipes. He also suggested that it should be left between the Company and the Middlesex County Council to say what size of pipe the Company should be allowed to put in. If they could not agree, it should be taken to an arbitrator, to be appointed by the Board of Trade.

After the Committee had considered the case in private,

The CHAIRMAN announced that, with regard to the gas and water companies, the Committee were of opinion that they should be afforded facilities; but they should not be granted the extraordinary facilities that both had asked. For the present requirements, at any rate, 14 feet of footpath on either side was quite enough.

On consideration of clauses, the following were added to the Bill in respect of the Committee's decision relating to gas and water mains:

CLAUSE 18A.

> The Council shall, so far as they conveniently can, permit any authority, company, or person having statutory powers so to do, to lay down or place under and, in accordance with the Statutes in that behalf, apparatus for the distribution of water, gas, or electricity, or telephonic or telegraphic purposes, in the soil under the footway on either side of the new roadway by this Act authorized, during and simultaneously with the construction of the portion of the footway under which it is desired to lay such apparatus.

The Company have, of course, powers under their existing Acts and under the general law to re-open the footpaths at any time for the general purposes of their undertaking. The position, however, is that whereas under the ordinary law the Company have power to break up the roadway, under this Act the power is transferred to breaking up the footpaths. The clause relating to the tunnels is as follows:

CLAUSE 18B.

> (1) In constructing the new roadway (work No. 1) by this Act authorized across any street or road in which are laid under statutory powers any gas or water main or pipe, or any pipe, tube, wire, or other apparatus for supplying electricity or used for telegraphic or other purposes (all of which are in this section called "apparatus"), the Council shall provide, where necessary, culverts of such dimensions, or make such other provision as may be reasonably requisite, for carrying such apparatus under the said work No. 1 and for enabling the authority, company, or person owning the apparatus (each of whom is in this section in relation to their own apparatus called "the owner") to obtain access thereto for the purpose of maintaining and repairing the same.
>
> (2) If within six months from the passing of this Act the owner shall give notice to the Council that he desires such culverts or other accommodation to be so made as to accommodate apparatus which the owner may desire hereafter to lay down, the Council shall provide such additional accommodation as may be reasonably requisite for that purpose, and for enabling the owner to obtain access thereto for the purpose of maintaining and repairing the same, and the additional cost incurred by the Council in pursuance of any such notice shall be repaid to the Council by the owner by whom the notice shall have been given.
>
> (3) If any difference arises between the owner and the Council as to any matter in this section referred to, such difference shall, unless otherwise agreed, be referred to, and determined by, an engineer or other fit person to be nominated, on the application of the parties in difference, or any or either of them as the case may be, by the President of the Institution of Civil Engineers, and subject thereto in accordance with the provisions of the Arbitration Act, 1889.

ISLE OF THANET GAS BILL.

HOUSE OF COMMONS COMMITTEE.—Monday, May 4.

(*Before Sir* HARRY SAMUEL, *Chairman*, *Mr.* FRANCE, *Mr.* ORDE POWLETT, *and Mr.* ROBINSON.)

Consideration of this Bill was taken up again to-day, following on the agreement between the parties, particulars of which were given in the "JOURNAL" last week, p. 363.

Mr. HONORATUS LLOYD, K.C., in addressing the Committee on behalf of the promoters, said that, with reference to Broadstairs, they had been able to arrange that the Isle of Thanet Company should purchase the whole of the land round the Broadstairs Gas-Works, and that the Broadstairs Company should have the option within two years to take over certain lands sufficient for their purposes, on terms to be agreed. He understood that the Broadstairs Urban District Council were not altogether satisfied with this; and therefore he asked the Committee if the point could be held over for the time being. With regard to the Margate Corporation, they desired that the Isle of Thanet Company should be obliged to supply at a pressure of 20-10ths. The Company were prepared to supply at 12-10ths, which was the pressure usually stipulated. A high pressure made gas bills go up and increased leakage. With reference to the question of testing-places, it was originally proposed there should be no testing-place at the Broadstairs works, and that the one in Margate should be sufficient. Now, however, the Corporation were not satisfied with the one at Margate, and wanted one at the new works. No evidence had been given as to the need for a testing-station at the new works.

Mr. TYLDESLEY JONES (for the Margate Corporation) said this was in the petition, and was one of the points he was going to raise. When dealing with the amalgamation, he said he would leave over a number of points, of which this was one. Owing to the agreement between the parties, he had had no chance of mentioning it.

Sir *Corbet Woodall* said the pressure provided in the Model Bill was 8-10ths. This was rather out of date now. He suggested that, with regard to testing-places, the stations at the two works should be abolished, and there should be only one arranged for—somewhere in Margate.

Mr. TYLDESLEY JONES said he absolutely agreed with this.

Cross-examined by Mr. TYLDESLEY JONES, witness said the 8-10ths specified in the Model Bill was insufficient. There was, however, no part of the district which had not a greater pressure than 12-10ths now. But even this did not give anything like the efficiency that should be obtained; and it was desirable for a consumer to have pressure of 20-10ths to get proper lighting. The only direction from which trouble might arise would be that the mains were perhaps too small for the extra pressure; and he thought this would be the case in the present instance.

The CHAIRMAN asked whether, if there was a pressure of 20-10ths, this would have any effect upon the works.

Witness said it did not affect the works at all, but only the size of the mains.

The CHAIRMAN asked if 20-10ths pressure had been put in any Bill.

Witness: No.

Mr. HONORATUS LLOYD said he knew of some cases in which a higher pressure than 20-10ths had been asked for, but not granted.

Mr. TYLDESLEY JONES, addressing the Committee, emphasized the fact that it was desirable that a pressure of 20-10ths should be given, and that it would not place any extra cost upon the Company.

The CHAIRMAN pointed out that it would require laying fresh mains.

Mr. TYLDESLEY JONES agreed, but said this was to bring the whole undertaking up to modern efficiency, and not directly because of the increase in pressure.

The CHAIRMAN asked Mr. Lloyd whether he could give any other reason why the Company were against the proposal.

Mr. HONORATUS LLOYD said it would be creating a precedent. He was willing, however, to meet the Corporation half-way, and accept 16-10ths.

The CHAIRMAN said he did not see that the Committee should fear precedent, and decided that, as the promoters' evidence had shown that nothing under 20-10ths would give efficiency, the consumers ought to have it.

Mr. LEES (Messrs. Lees and Co.), on behalf of the Broadstairs Urban District Council, said he had previously pointed out that a reasonable area should be left around the Broadstairs Company's works to allow them to extend in the future. These lands had been purchased by the Broadstairs Company; and the Bill now proposed that the Isle of Thanet Company should acquire them. All the Isle of Thanet Company proposed was that, if the Broadstairs Company desired, they could purchase a piece of land for future extensions of their works within two years; but if the Broadstairs Company did not exercise this option, they would never be able to extend in any way whatever on these lands, and the amalgamation scheme originally proposed would have to come about. He had no reason to suppose the option of purchase would be exercised within two years.

The CHAIRMAN said the Isle of Thanet Company should have access to the new works; but there should also be a reasonable area left for the Broadstairs Company to extend.

Mr. HONORATUS LLOYD said it was not right that the Isle of Thanet Company should hold land for all time, and not be able to use it.

The CHAIRMAN agreed, and asked if he would extend the period during which purchase could be made by the Broadstairs Company from two to five years.

Mr. HONORATUS LLOYD said he would; and he was perfectly willing for the Broadstairs Company to buy the land at once, if they desired to do so.

The CHAIRMAN announced that the Committee had decided that the Broadstairs Company must buy part of the land at once.

The Committee finally adjusted the remaining clauses on the following day (Tuesday); but no points arose on them.

EDENBRIDGE AND DISTRICT GAS BILL.

HOUSE OF LORDS COMMITTEE.—Wednesday, May 6.

(*Before the Marquis of* WINCHESTER, *Chairman, Lord* RAVENSWORTH, *Lord* ERSKINE, *Lord* MONKSWELL, *and the Marquis of* SLIGO.)

The objects of this Bill are to incorporate the Edenbridge and District Gas Company, and to confer further powers upon them with regard to capital, extension of works, and the supply, price, and testing of gas.

Mr. COURTHOPE MUNROE appeared for the promoters. A number of owners, lessees, and occupiers of dwelling-houses near the gas-works were represented by Mr. W. W. M. ACWORTH; the Institute of Chartered Accountants and Society of Incorporated Accountants and Auditors by Mr. J. D. FITZGERALD, K.C., and the Hon. EVAN CHARTERIS; and Mr. A. H. Hastie and Mrs. Edna Corbett by Mr. HASTIE personally.

Mr. COURTHOPE MUNROE said that the Edenbridge Gaslight, Coke, and Coal Company, Limited, was established in 1867, and supplied gas in the Edenbridge district up to the present with the approval of the local authority. The original capital was only £2000, being subsequently reduced to £177; but it had now grown to £5000. The Company had paid quite small dividends up to a few years ago, and had been conducted on very conservative lines, and a considerable portion of the revenue had been spent in increasing the works. Some time back, the average dividend paid was 2½ per cent.; but during the last few years there had been a change of management, and the Company had been paying 6 or 7 per cent. The time had now come when the Company could be usefully turned into a statutory concern, and have conferred upon them the powers usually given to parliamentary companies, and should be permitted to supply gas not only in Edenbridge, but also in Chiddingstone, Cowden, and Hever, and parts of the parishes of Westerham, Penshurst, and Brasted, in the County of Kent. The Company wished to be incorporated under the name of the Edenbridge and District Gas Company, and to have their capital powers fixed. In this respect they had got £5000 capital paid up, upon which in the ordinary course they would be entitled, if they could do it in future, to pay 10 per cent.; but inasmuch as it was now the practice to issue a larger amount of stock at a lower dividend, they asked that the capital should be converted into £7142 of 7 per cent. stock. They also asked for £858 of 7 per cent. stock, representing the amount expended by the limited Company out of revenue upon extensions and improvements, and £7000 of new 7 per cent. stock, to enable them to extend the undertaking and make alterations; the three items together making a total of £15,000. The Company also asked for the usual borrowing powers of one-third, inclusive of the sum of £1500 already borrowed; so that the actual sum to be borrowed would be £5000 less £1500—making £3500. The Company also asked to be made into a sliding-scale Company, with a standard dividend of 7 per cent., and a standard price of 4s. 6d., although the present price actually charged was 4s. 2d. It was also proposed to purchase an extra 5 acres of land by agreement for the development of the works. A calorific test was proposed to be imposed; and though in the Bill the standard was put at 540 B.Th.U. gross per cubic foot, and the penalty point 475 B.Th.U., the Company were prepared to adopt the figures given in the Gas Light and Coke Company's Bill—namely, 540 and 500 respectively. With regard to a testing-place, it was not proposed to provide one; but an agreement had been come to with the local authority that if at any time they wanted one they should have power to require it. Counsel next referred to the clause dealing with the auditing of the accounts, which originally specified that the auditor should be a member of the Institute of Chartered Accountants or the Society of Incorporated Accountants and Auditors. The London Association of Accountants had lodged a petition saying that they should be included, and the Company put forward the view in the Bill that a professional body should do it, and gave an undertaking that they would leave the matter in general terms.

The CHAIRMAN, without further discussing the question, said the amendment was to be struck out and the original words restored.

Mr. MUNROE, continuing, said that some time ago Mr. Soutter, one of the petitioners, purchased a house between the sewage farm and the gas-works. Apparently, however, he did not like either; and the moment the Company endeavoured to put themselves on a parliamentary basis, they met with the greatest possible hostility.

Mr. ACWORTH said that the petition was not from Mr. Soutter alone, but from 27 owners and occupiers near the works.

Mr. MUNROE said that the petitioners objected on the ground that the present scheme would increase the already excessive price of gas; but as the Company were proposing to adopt the sliding-scale, a large part of the benefit would go to the consumers. Objection was also taken to the nuisance due to the proposed enlargement of the works, that the works were in the wrong place and should be shifted near the railway line and so save the cost of cartage of coal and the wear and tear of the roads, and to the breaking-up of streets.

After some argument by Counsel on the question of *locus*,

The CHAIRMAN announced that the Committee would hear petitioners on the whole case.

Mr. *H. S. Whitmore*, the Chairman of the Gas Company, said that the Company had been on the best of terms with the local authorities always, and corroborated Mr. Munroe's statement that the Parish Council had memorialized the Rural District Council in their favour. The latter had gone very thoroughly into the matter; and terms were eventually come to.

Mr. ACWORTH, in cross-examination, suggested that it would have been a more economical method to have gone to the Board of Trade for a Provisional Order in this case; but witness said that the matter had been thrashed out, and they had come to the conclusion that it would be best to adopt parliamentary powers. He could not satisfy Counsel as to why the Company wished to buy 5 acres of land.

In re-examination by Mr. MUNROE, witness said that the Company had to buy the 5 acres of land in order to secure the portion they required, which only amounted to half-an-acre.

Mr. *A. Dougall*, the Engineer and General Manager of the Tunbridge Wells Gas Company, said he had been consulted by the Company in connection with the present scheme. The structural valuation of the works he estimated at £7712. The Company were asking for £7000 of additional capital, which would last about ten or twelve years. Assuming the Company were granted the £15,000 asked for, £1000 would have to be spent in improving the capacity of the works. By the expenditure of this sum the daily output would be doubled. Money was also required to deal with the natural growth of the district, which during the last seven years had doubled its consumption. With regard to the sliding-scale, this he described as an incentive to economy. Mr. Acworth had suggested that the present standard price of 4s. 6d. was much too high; but comparing Edenbridge with Crowborough, the population of which was three times as large, and whose consumption was also three times as great, the standard price was the same, but the actual charge was 4s. 4d., as against 4s. 2d. in Edenbridge. In the case of Crowborough, however, a discount was allowed, which brought the price down to about 3s. 10d. The point had been raised in the petition that the works could be shifted near the railway, so as to avoid the cost of carting the coal to the works; but the price charged was only 1s. 1d. a ton. He never heard any complaints of nuisance from the works, as they were a little way from the middle of the village.

Mr. ACWORTH, in cross-examination, asked witness whether, having regard to all the circumstances of the case, if he were for the first time establishing a works for the whole of the new area and the existing one, he would put them on the present site. Witness replied that the present site was a suitable one; but, on Counsel pressing the point, he said he would perhaps go a little nearer the railway. Referring to the point that the capacity of the works could be doubled for the small sum of £1000, witness said there would simply have to be an addition of two retorts in the present retort-house, which was large enough to accommodate them. The gasholder was constructed so that another lift could be added, and no plant would have to be scrapped. On the question of the cartage of coal from the railway to the works, this also tended to increase the price of gas, and also the wear and tear of the roads. With regard to the Company supplying Hever and Cowden, Counsel said that this would not be justified, on account of the expense of laying mains for the purpose; but witness replied that the Company would do so if the districts mentioned grew in the future.

In cross-examination by Mr. HASTIE, witness admitted that there was no present intention of supplying in Cowden.

Mr. ACWORTH asked witness whether the Company could extend the works to cope with the extra demand without actually using more ground.

Witness said this was so; but if they were to provide for the needs of the area they would have to provide for the extra requirements as the population increased, and they would want more land in order to extend in the future.

Mr. *F. Playfoot* and Mr. *R. V. Smith* gave evidence in support of the Bill, and stated that the greater portion of the inhabitants supported the Company's scheme.

Thursday, May 7.

On the resumption of the proceedings this morning,

Mr. *Charles Cheale*, the Manager and Secretary of the Edenbridge Company, said that the present area of supply was 5329 acres, and there were about 4 miles of mains. The amount of gas made in 1904 was nearly 3 million cubic feet; in 1913, it was 5 millions. In this time the amount of coal carbonized had increased from 335 to 706 tons, and the number of consumers from 177 to 452.

In cross-examination by Mr. ACWORTH, witness said that a piece of land had been agreed upon for the extension of the works, at a price of £300.

Mr. HASTIE cross-examined on the point that certain works had been paid for by the Company out of revenue which ought legitimately to have been charged to capital, and that the effect of this had been to keep the dividend down to 5 per cent. when 8 per cent. might have been paid. Since 1901, however, the dividend had not been below 5 per cent.

The CHAIRMAN pointed out that in the whole of the area proposed to be supplied under the Bill there had been a small increase between 1901 and 1911; but if Edenbridge was taken away, there was a decrease in the remainder of the area.

Mr. MUNROE suggested that some work that was being done in the neighbourhood had been completed, with the result that a large number of workmen had left; and this probably accounted for the decrease.

The room was then cleared. On the re-admission of the parties,

The CHAIRMAN announced that, with a view to shortening the proceedings, the Committee would only be prepared to allow, in the event of granting the Bill, the period over which the Company's powers may lapse to be three years instead of five years as in the Bill.

Mr. ACWORTH said that there were very large capital powers asked for; and in the event of the Bill being passed, should the Company fail to supply the outside districts, as would probably be the case, they would have very large capital powers for a small area, and would be free from the control of Parliament for an indefinite period.

Mr. MUNROE agreed, and said that the only question would be the amount of the capital in this event.

This closed the case for the promoters.

Mr. *H. O. Soutter* (one of the petitioners) said he viewed with alarm the extension of the works. With one exception, the petitioners were all consumers of gas, and therefore, he thought, they represented the general body of consumers. As a matter of fact, he himself was a holder of gas shares; but he felt bound to protect his own interests. He did not object to the works being extended for the supply of Edenbridge and the remainder of the present area; but he did not see why there should be extensions in Edenbridge for the benefit of the outside districts.

In cross-examination by Mr. MUNROE, witness said his house was built before the erection of the gas-works. He admitted that when he bought the house he knew the gas-works existed, although he was not aware that the sewage-works were near. He was the only member of the Parish Council who objected to the Company's scheme.

Mr. *G. C. Lockett*, another petitioner, said he objected to the Bill, as the largest private consumer in Edenbridge. He was not opposed to a sliding-scale on principle, provided that the basis was a fair and equitable one. But the large increase of capital in this case would mean that the sliding-scale would work in such a way that the price of gas in the district would not be brought down as rapidly as would otherwise be the case. He knew of no more unsuitable time for fixing the standard price for any gas company in the south-east of England than the present, owing to the position with regard to Kent coal.

Mr. ACWORTH said that if the Committee would say that the Company might have a 5s. price as a maximum to-day, and should go to the Board of Trade within (say) five years, to fix a standard in relation to the new facts, the question would perhaps be disposed of.

Mr. *Arthur Valon* (of Messrs. W. A. Valon and Son), said he did not think the Company would supply the whole of the added area within reasonable time. If they did, the chances of it being remunerative were very poor, unless there was some large unforeseen development. Additional capital of £4000 would, in his opinion, be sufficient to last the Company for 14 or 15 years—the usual practice of Parliament—assuming that they only supplied the present area. They were now supplying 92 per cent. of the population, and could only rely upon increases of population and actual building taking place. He agreed with Mr. Dougall's estimate of £1000 for improving the capacity of the works, and £3000 for mains, meters, and stoves, and also with the petitioners' suggestion that it would be reasonable to have a reduction of capital if there was a reduction in the area supplied. With regard to the new area, he did not think anybody else would want it. It was possible, however, that another company might be nearer to a part of it than Edenbridge whom it might pay to supply, whereas it would not pay the Edenbridge Company.

The CHAIRMAN pointed out that there were no other companies opposing the Bill.

Mr. ACWORTH replied that no other company had power to oppose, because it was outside the area of any company.

Witness, continuing, said he regarded 4s. 6d. as too high for the standard price at present, owing to the fluctuation in the price of Kent coal. Therefore it would be best to fix a maximum now and leave the standard until later on. The area of land which the Company proposed to buy—namely, 5 acres—was the amount that would be required for a works forty times as large as these. Even one acre would be a lot more than was usually required for works of this size. If the Company had any real prospect of considerable growth in the district, however, he thought it would be better for them to remove their works before they made the extensions.

In cross-examination by Mr. MUNROE, who suggested that it was an advantage to the area to have a respectable gas company possessing powers to supply, witness said that unless there was a prospect of the area being supplied it should not be ear-marked by the Company. The price of coal had now gone down; and the Company could supply gas at 4s., and be as well off as last year, when they were supplying at 4s. 2d. Therefore the price fixed should be 4s.; and no margin at all should be allowed. With regard to the 5 acres of land proposed to be bought, Counsel pointed out that it was difficult to buy such a small piece of land as half an acre. Witness, however, said he had not found any difficulty in this respect when buying land for gas-works. There should be a certain margin; but not such a large one as in this case. Counsel proposed to reduce the 5 acres to 3 acres; but witness maintained that 2 acres were more than the Company would want.

Mr. *Hastie* then went into the witness chair to give evidence in support of his own petition. He said he was one of two trustees in Cowden who owned practically all the land round the village. There had been no demand for gas lighting so far as he knew. He submitted that it was the practice of Parliament to ask the opinion of the inhabitants before allowing anybody to have authority over them; but no witness was called with regard to this particular district. There was no evidence that it was the honest intention to supply Cowden. Coming to the real point of his opposition, under the provisions of the Act the Company had the power to break up what were called "streets"—which term included field footpaths not repaired by anyone—and also to lay mains under them. If the Company laid pipes along these footpaths, there would be no power on the part of the owner to make them take them up so that he could use the land for building.

Friday, May 8.

Mr. ACWORTH this morning addressed the Committee on behalf of Mr. Soutter and his fellow petitioners, and suggested that the Company had no case at all for promoting the Bill. It was wrong to suppose that if powers were now to be granted the Company would supply all the 30 square miles. If the Company were going to supply the whole of this new area, they should take the works to a new site, or else stop on the present site and supply the old district. He also asked that the new capital should not exceed £4000. The figure should be fixed on the basis of its being actual capital remunerative at the ordinary rate of 10 per cent., and not correspondingly inflated capital remunerative at the rate of 7 per cent. He also asked the Committee not to allow a sliding-scale, but to adopt what had been quite a recognized precedent, and say that the Company may have a maximum price; but if they want a sliding-scale price hereafter, they should go to the Board of Trade. If a sliding-scale was adopted, however, the standard price of 4s. was as much as ought to be allowed.

Mr. MUNROE made just a few observations to the Committee on behalf of the promoters. He maintained that the Bill was a proper and reasonable one, having regard to the fact that the Company were backed by the local people. As a result of conferring with the Rural District Council, the new capital asked for had been reduced from £10,000 to £7000. They had also decided to insert clause 49A, providing that authority to supply the larger areas should cease after five years if the powers were not acted upon; but this had been reduced by the Committee to three years. It had also been agreed to provide a testing-place should the Council require it. With regard to a stand-by supply, although it was originally provided that the charge for this should be 25s. per quarter, it was subsequently reduced to 12s. 6d. Referring to the ratepayers' petition, surely, after the Council had gone into the proposal thoroughly, it was hard on the promoters that, at the instance of one gentleman, these petitioners should go behind the backs of the other members of the Council. He submitted that all Mr. Soutter was entitled to be heard upon was the question of nuisance. But there was very little in this. There had only been two of the petitioners giving evidence—Mr. Soutter and Mr. Lockett. Mr. Lockett happened to have a considerable interest in Kent coal. His firm had been devoting time and attention to the introduction of this coal for gas-making purposes; and therefore he was really there to advertise it.

After the Committee had conferred privately,

The CHAIRMAN announced that the preamble of the Bill was proved, subject to clause 49A, as already stated, being altered so that the powers of the Company, so far as the additional area was concerned, would lapse in three years instead of five years. The capital was to be limited to £12,000, subject to a reduction of £500 per mile of mains if not laid in the additional area within three years. The standard price is to be 4s. 6d., as suggested in the Bill.

KINGSTOWN ELECTRIC LIGHTING SCHEME.

HOUSE OF COMMONS COMMITTEE.—Thursday, April 30.

(*Before Sir* EDWIN CORNWALL, *Chairman*, *Mr.* BIGLAND, *Mr.* DANIEL BOYLE, *and Mr.* MACKINDER.)

ELECTRIC LIGHTING PROVISIONAL ORDER No. 8 (KINGSTOWN) BILL.

The object of this Order is to authorize the Dublin Southern District Electric Supply Company to supply electricity in Kingstown.

Mr. BALFOUR BROWNE, K.C., and Mr. VESEY KNOX, K.C., appeared for the promoters. The Alliance and Dublin Consumers' Gas Company were represented by Mr. J. D. FITZGERALD, K.C., and Mr. C. H. G. CAMPBELL; and the Kingstown Urban District Council, by Mr. W. D. HARBINSON.

Mr. VESEY KNOX, for the promoters, said the Bill confirmed an Electric Lighting Provisional Order granted to the Dublin Southern Electric Supply Company in 1913 in respect of Kingstown. There was, in addition, a Bill promoted this session by the Alliance and Dublin Consumers' Gas Company, who also proposed to take powers for the electric lighting of Kingstown and the adjoining districts of Blackrock and Dalkey. So far as Kingstown was concerned, these two proposals were competitive. The procedure usually adopted in such cases was that the first Bill should be opened, and the promoters should deal, in the course of their arguments and evidence, with their opposition to the second Bill as well. Then the case for the opposing Bill should be taken, and, following that, there should be the oppositions to the first Bill, and, so far as they were common, the oppositions to both Bills. For instance, the Kingstown Council were opposing both Bills; and, therefore, they would be entitled to be heard twice if the Bills were taken separately. To avoid this, however, he had made the suggestion.

In opening the case for the Dublin Southern Company's Order, Counsel remarked that Kingstown was a residential suburb of Dublin, governed by the Kingstown Urban District Council. In 1896, the Commissioners of Kingstown, the predecessors of the Urban District Council, obtained an Electric Lighting Order. Nothing was done for eight years; and in 1904 the Order was revoked. Since then a number of members of the Council had been anxious to get somebody to supply electricity in the district, but failed. In 1911 there was general discontent with the gas supply, and the members of the Council formed a small informal committee to see whether something could be done in the way of getting electrical competition; but they did not seem to have met with much success. Then they approached the Tramway Company with a view to taking a supply of electricity from their mains. But the Company were bound by Parliament, at the instance of the Dublin Corporation, not to supply electricity in the district for anything but tramway purposes. To get rid of this restriction, the Tramway Company would have to incur the expense of promoting a Bill in Parliament; and the Dublin Southern Company had therefore finally decided to erect their own generating station. In 1912, a member of the Kingstown Council approached the Councils of Kingstown, Blackrock, and Dalkey, asking for powers for a non-statutory company, who would supply electricity in the three districts, to break up the streets. The Urban District Councils of Kingstown and Dalkey agreed under certain conditions; but Blackrock refused. Mr. Murphy, the promoter of the present scheme, was then asked to come into the enterprise; but he refused to put his money into a non-statutory concern. Subsequently, however, it had been decided to obtain the present Order. With regard to the petition of the Gas Company, whose area of supply included Kingstown, this stated that, under the powers which would be conferred upon the Company, the carrying on of the Gas Company would be interfered with. They were already authorized to supply gas, and also electricity with the sanction of the Board of Trade; and they were prepared to apply for this sanction and supply. Counsel pointed out, however, that, although they had had these powers for a very long time, the supply had never been given.

Mr. *W. M. Murphy* gave evidence in support of the scheme.

Mr. HARBINSON, for the Kingstown Urban District Council, in cross-examination, said that the power granted to the proposed non-statutory company in 1912, with regard to the breaking-up of streets, was on the condition that the Blackrock and Dalkey Councils approved of the undertaking, and also that the Kingstown Council should have authority to purchase.

Mr. FITZGERALD, on behalf of the Gas Company, in cross-examination, ascertained that the Electrical Company had the option of two sites for their generating station in Kingstown, but had not yet decided which one would be utilized. Counsel insisted that the proposed site should have been scheduled to the Bill: so that residents within 300 yards of the works might have an opportunity of opposing the scheme if they thought fit.

In answer to the CHAIRMAN, witness said that if the present Order was obtained in respect of Kingstown, the Electrical Company could enter into agreements to supply areas outside, under the Electric Lighting Act of 1909.

Mr. FITZGERALD remarked that they would not have power to break up streets.

Mr. *W. Tatlow*, an electrical contractor, who assisted in getting out the scheme, said that there were two ways of supplying in Dalkey and Blackrock. In the first place, they could give a supply in Dalkey as a non-statutory company, and take a transfer of the Provisional Order possessed by the Blackrock Council, without coming to Parliament, but with the consent of the Board of Trade, if the parties were agreeable; and, secondly, they could supply in bulk. The present scheme would, in his opinion, be a financial success.

Cross-examined by Mr. FITZGERALD, witness said that, in the event of supplying Dalkey, the mains could perhaps be carried along the railway, along the roads, or by overhead wires. He believed the Railway Company were willing to allow this; but Counsel held the opposite view. With regard to the poles for carrying the wires, it would be possible to erect them on private ground.

Mr. VESEY KNOX, for the promoters, pointed out that the power under the Electric Lighting Act of 1909 to supply premises outside the statutory area carried with it authority to break-up streets as far as was necessary to reach the premises in question.

Mr. FITZGERALD, however, stuck to the point that legal power could not be granted to supply without parliamentary sanction.

Continuing under cross-examination, witness said it was proposed to set up a gas-producer plant for driving the dynamos. For this purpose it was intended to use anthracite coal, the price of which had been quoted at 25s. per ton, including cartage. This coal would have to come from Swansea; and Counsel challenged the accuracy of the price mentioned.

Mr. *M. Crowley*, of Messrs. Crowley and Co., Chartered Accountants, gave evidence that the Gas Company's profits had shown a tendency to fall off in recent years.

Mr. CAMPBELL, on behalf of the Gas Company, in cross-examination, pointed out that the Company had been authorized by their Act of 1909 to raise an extra £400,000 of capital, and that Parliament must have been satisfied that the Company was being properly carried on before they would allow this.

The hearing was continued on Monday, Tuesday, and Wednesday of last week.

On Monday, detailed figures were given of the Electric Supply Company's scheme by

Mr. *W. Tatlow*, consulting electrical engineer; the total amount being £25,133 for the initial scheme. After the end of the second year a further capital expenditure of £4750 was anticipated. With an average price of 4¼d. per unit sold, a gross profit of £25 was expected in the first year, £795 in the second year, and £1027 in the third year.

Sir *Thomas Robinson*, ex-Chairman of the Kingstown Urban District Council, gave general evidence in support.

THE GAS COMPANY'S SCHEME REJECTED.

On Monday also, the scheme of the Gas Company was outlined in their opposition to the Electric Supply Company's proposal.

Mr. J. D. FITZGERALD, K.C., related the history of the Gas Company, and drew attention to the economies which would accrue from the electric lighting being in the hands of the Company, who had the land for the power station and would use gas-engines to drive the dynamos. In the case of the Electric Light Company, a site had still to be found. In any case there was bound to be delay, as a Board of Trade inquiry would be necessary before the site could be purchased. On these grounds, the Gas Company contended they had the best scheme, although neither party believed that the undertaking would be a gold mine.

When the proceedings were resumed on Tuesday,

Mr. *F. T. Cotton*, the Secretary and Manager of the Alliance and Dublin Gas Consumers' Company, gave evidence in support.

To the Gas Company's scheme, the Dublin Corporation opposed, having been granted *locus* by the Court of Referees. [See "JOURNAL" for March 17, p. 746.]

Mr. BALFOUR BROWNE, K.C., who appeared for the Corporation, conducted a long cross-examination of Mr. Cotton, who admitted that the Gas Company had promoted their scheme solely because Mr. Murphy had launched his; the Company considering they had a prior claim to the district. Witness also admitted that the real reason for promoting the Bill was to prevent competition for electricity supplied by an outside concern. After some questions as to the present financial position of the Company, witness was interrogated closely as to a report prepared by Messrs. Newbigging and Herring, at the instance of the shareholders. This report, however, witness contended, was confidential, and had nothing whatever to do with the Dublin Corporation, who had no right to ask for it and unless ordered by the Committee to do so, he would refuse to produce it.

In answer to the CHAIRMAN, witness said the report would not be presented to the shareholders unless it was called for at a meeting.

Mr. WHITE, for the Corporation: Has it been referred to in the "JOURNAL OF GAS LIGHTING" for April 14 last as "The Concealed Report"?

Witness: Yes; but they have never seen it.

Replying further to the CHAIRMAN, witness said the report made certain recommendations, and expressed the belief that the Company's undertaking could, in a short time, be brought up to a satisfactory condition if certain suggestions were carried out. In order to carry out these suggestions, the Board had appointed Mr. Newbigging as Consulting Engineer. Already Mr. Newbigging had appointed an Assistant at the works under his control; and with the infusion of some new blood on the Board, in the shape of business men from this side of the Irish Channel, he did not doubt that in the course of a very short time the Company, who had got over some of their difficulties already, would be in a very satisfactory position.

Mr. *E. Manville*, consulting electrical engineer, estimated the capital expenditure upon the Gas Company's proposed electrical undertaking at £32,000, of which £11,875 was attributable to the generating station and £17,225 to mains. The revenue he put at £6343, and the working costs at £3719; leaving a net profit of £2624. This was equal to 8·2 per cent. on the capital outlay.

Without calling upon the other side, the Committee decided, on the evidence and arguments of the Gas Company, to reject their scheme.

THE NORTHUMBERLAND CLAUSE REFUSED.

The opposition of the Kingstown Corporation to the Dublin Southern Electric Supply Company's Order was then gone into.

On Wednesday, on the suggestion of the Committee, an agreement was come to under which the Order should be granted to the Dublin Southern Electric Supply Company, but that the powers should not be exercised for six months, or such extended period as the Board of Trade may allow, without the consent of the Urban District Council, in order to allow of the Council taking over the Order.

During the consideration of clauses,

Mr. CAMPBELL, on behalf of the Gas Company, asked the Committee to insert the Northumberland Clause in the Order—such clause, of course, to come into operation only should the Order be transferred to the Council. He suggested that the first period should be five years, with revision of prices then and at the end of every subsequent three years, in order to prevent any loss falling upon the rates. He reminded the Committee that such a clause was now always inserted in Provisional Orders by the Board of Trade when it was asked for. The only case of refusal by a Committee that he knew of was in the Newport Bill this year. But this was because the electrical clauses of the Bill had previously been rejected.

Mr. VESEY KNOX, for the Dublin Southern Company, said the matter did not concern him, although he could never understand how the clause could have any useful benefit. He had never known of the clause having been of any value.

Mr. HARBINSON, for the Kingstown Urban Council, resisted the clause, and urged that no special circumstances had been shown for its insertion in this instance. The undertaking was not likely to be unsuccessful; and the Gas Company were not entitled to special consideration at the hands of the Committee.

The CHAIRMAN said all petitioners were entitled to consideration at the hands of the Committee. He thought it was a very proper application for the Gas Company to make. He could quite understand that if there was any charge to be put on the rates, the people who were rated as the Gas Company were were entitled to consideration. Would not it be possible to have some form of words so that, in the event of there being a loss on the undertaking, the Council should come under the clause then?

Mr. CAMPBELL said there was little doubt that if this application had been made to the Board of Trade, the clause would have been granted.

The CHAIRMAN, after consultation with the Committee, said they thought that while it was a very proper application for the Gas Company to make, they did not feel they could allow the clause.

THE GAS COMPANY'S "ONE CLAUSE" BILL.

Mr. CAMPBELL then made a request with regard to the Gas Company's Bill, which he said was not opposed. So far as electric lighting was concerned, the Bill had been rejected; but there was in it clause 21, dealing with quite a domestic matter affecting the Company. Under some of the Gas Company's Acts, the voting clauses of the Companies Clauses Consolidation Act had been incorporated; but in others they had not. In 1909, the Company's capital was converted; and there had been some difficulty as to the precise voting powers of the holders of the 10 per cent. and 7 per cent. stocks. To clear this up, clause 21 of the Bill had been inserted under the advice of an eminent Irish K.C. Therefore, he asked that the Gas Company's Bill should go forward as a one clause Bill, with the addition of clause 24 as originally drafted, providing for the payment of the costs of the Bill by the Company, as usual. This would obviate the Company having to come to Parliament on a future occasion to put this matter right.

After some discussion, the Committee agreed to the adoption of this course.

HIGHTOWN GAS AND ELECTRICITY BILL.

HOUSE OF LORDS COMMITTEE.—Tuesday, May 5.

(*Before Lord* CLINTON, *Chairman, Earl* RAVENSWORTH, *Lord* GORELL, *Lord* MONKSWELL, *and Lord* ERSKINE.)

This Bill proposes to incorporate the Hightown Gas and Electricity Company.

Mr. RAM, K.C., and Mr. JACQUES ABADY appeared for the promoters. The only opponent on preamble was Mrs. Gregg, who was represented by Mr. SQUAREY. Mr. J. D. FITZGERALD, K.C., and the Hon. EVAN CHARTERIS appeared on behalf of the Institute of Chartered Accountants of England and Wales, and the Society of Incorporated Accountants and Auditors, against alteration.

Mr. RAM, in opening, said Hightown was in the Urban District of Little Crosby, between Liverpool and Southport. It was the residential part in which considerable development was taking place. A Company called the Hightown Land and Development Company (in liquidation) had a petrol air-gas system, which, though not very satisfactory, the promoters were taking over. With regard to the gas proposals, there was no opposition; but there was one opponent to the electrical powers—the wife of a builder, who had a small private generating plant. This was originally installed to supply her own house; but the supply had since been extended to a number of houses, and the Council had not objected to an overhead cable being carried across one of the roads. There were, however, no statutory powers; and the use of this cable could be prohibited at any moment. Mrs. Gregg claimed

that her undertaking should be purchased by the promoters before they were allowed to come into the district; but while he refused to do this, for the reason that it was a non-statutory undertaking and the plant would be absolutely useless for the purposes of the new Company, he also raised an objection to Mrs. Gregg having *locus* to be heard before the Committee at all. If he were to quote cases decided in the Court of Referees, he would be on very firm ground indeed in resisting her *locus*; but without doing this for the moment, he would merely say that he was not proposing to interfere with Mrs. Gregg's electrical business in any way; and that she could go on after the Bill were passed just as she was now.

Mr. SQUAREY said he asked for discretionary *locus*. He did not believe there was any case on all-fours with this which could be quoted as a precedent; but it would be a very great hardship on Mrs. Gregg if the sum of £1200 which she had put into the electrical installation, was to be jeopardized without her having the opportunity of putting her case before the Committee. At one stage, the promoters had negotiated with a view to purchasing the plant.

The CHAIRMAN said the Committee were of opinion that the petitioner had no *locus* to be heard.

Mr. RAM, dealing with the petition of the Chartered Accountants, said the Bill provided for the appointment of an accountant. As originally drawn, clause 24 provided for the appointment of a member either of the Institute of Chartered Accountants or the Society of Incorporated Accountants. At the instance of the London Association of Accountants, the names of the two bodies had been taken out of the clause, leaving it open to members of all three bodies to compete for the auditorship. The Institute of Chartered Accountants and the Society of Incorporated Accountants appeared against this alteration; but he was quite indifferent, and would leave the Committee to decide.

The Hon. EVAN CHARTERIS related the history of the attempts this session on the part of the London Association of Accountants to secure the insertion of their name in the audit clauses of Gas and other Bills. He asked the Committee to restore clause 24 to its original form.

The COMMITTEE assented to this.

Mr. JACQUES ABADY said the Bill contained no illuminating value clauses; but he proposed to ask for the same calorific test as had been agreed in the case of Liverpool—viz., 550 B.Th.U., and a margin of 5 per cent. The Company might have to take a supply in bulk from the Liverpool Company, and it would be as well to have the same quality gas.

The CHAIRMAN said that as the Company were so near to the Liverpool Company the clause should be the same.

The actual clauses were subsequently passed, and the Bill ordered to be reported for third reading.

Wednesday, May 6.

The clauses were passed this morning. The calorific value figures were identical with those in the Liverpool Bill.

The CHAIRMAN speaking with regard to the clause dealing with auditing, which was discussed the previous day, said he could not help feeling that the promoters had some responsibility in this matter. He presumed they knew that the insertion of the name of the London Association of Accountants had been attempted before and failed.

Mr. RAM agreed it was known to the promoters.

The CHAIRMAN said the action of the promoters in altering the clause had resulted in Counsel having to be present unnecessarily on behalf of the other accountants institutions; and it seemed to him that this was not a procedure which should obtain in the Committee-rooms.

The Bill was then sent forward for third reading.

The capital of the Company is to be £40,000, in £10 shares; and the first Directors are to be Messrs. Isaac Carr, E. E. Linaker, W. Moncrieff Carr, and four other persons. The Company are to be a maximum price company, with a maximum price of 5s. per 1000 cubic feet. The capital is to be reduced to £25,000 if the electricity powers are not exercised within three years.

PORTHCAWL URBAN DISTRICT COUNCIL BILL.

Question of Compensation to Officers.

HOUSE OF LORDS COMMITTEE.—Thursday, May 7.

(*Before Earl* PLYMOUTH, *Chairman*, *Lord* DIGBY, *Lord* CRAWFORD, *Lord* ST. LEVAN, *and Lord* DE MORLEY.)

The objects of this Bill are to transfer the undertaking of the Porthcawl and District Gas Company to the Urban District Council on such terms as may be agreed upon, or, failing agreement, to be determined by arbitration in accordance with the provisions of the Lands Clauses Act. The financial provisions are, in addition to the purchase price of the undertaking, £10,000 for extensions and improvement, and £1000 working capital.

Mr. TYLDESLEY JONES appeared for the Urban District Council; and Mr. RAM, K.C., represented the Gas Company, the only petitioners.

Mr. RAM, in opening, said that clause 85 of the Porthcawl and District Gas Act, 1913, provided that if the Council should introduce a Bill in the next session of Parliament to purchase the gas-works, the Company should not oppose the Bill except in so far as they may deem necessary to protect their own interests. Therefore he could not oppose the Bill on preamble. The Company were anxious, however, that the Council should pay compensation to officers and servants of the Company who had been in regular employment, and who were to be dismissed on the transfer of the undertaking to the Council. The promoters' point was that, under an arrangement made last year, this matter should be taken as settled; but his instructions were that, though there was a very large amount of discussion last year, it was not limited to this. The discussion took place at a meeting on April 23, 1912, to consider whether the Council should oppose the Company's Bill of last session. It was eventually decided, however, that there should be no opposition, and the Bill went through unopposed, with the insertion of clause 85, to which he had referred; and this enabled him to lodge a petition with regard to the compensation of servants. Mr. Tyldesley Jones said that this matter had been discussed and agreed; but this was not so. The Company wanted a clause inserted to this effect.

Mr. *T. G. Jones*, the Chairman of the Porthcawl Urban District Council, formally proved the preamble of the Bill; and the Committee adjourned.

Friday, May 8.

When the Committee sat this morning, evidence was called on behalf of the Gas Company.

Mr. *E. H. Stevenson* spoke as to the meeting referred to between the Company and the Council. So far as the principle of purchase was concerned, it was agreed that the Company should not oppose the Bill on preamble. He expressed the opinion that it was very improper for an undertaking to be transferred and the services of the officers dispensed with through no fault of their own; and a clause was inserted in almost every purchase or amalgamation Act with regard to this matter. In this case, there were only two persons concerned.

Mr. TYLDESLEY JONES, in cross-examination, asked who were the two persons referred to.

Witness: The Secretary and the Works' Manager.

Continuing, witness said that the Urban District Council had lodged a petition against the Gas Company's Bill last year; but it was withdrawn on condition that the standard price of gas was to be 4s., the electricity powers were to be struck out, and a purchase clause inserted on the lines of the Hitchin and District Gas Act, 1905, sub-clause 5 of which provided that the Council should pay compensation to officers and servants in the regular employ of the Company not retained by the Council. This clause was, however, struck out at the meeting, because the Council would not agree to it. Sub-clause 6 was also struck out [this provided that the Company should not, except with the consent of the Council, raise any capital in pursuance of the Act prior to the passing of the Act], because the Company would not agree to it.

Mr. TYLDESLEY JONES asked if witness agreed that during the negotiations when section 85 of the 1913 Act was agreed, it was distinctly stated by the Company that they did not desire this compensation.

Witness: Not to my knowledge.

Mr. *J. Elias*, the Chairman of the Gas Company, and Mr. *J. Elias*, the Secretary, gave evidence to the effect that the question of compensation was not settled at the meeting, and denied that the Company had decided that the officers would not require compensation.

Mr. *T. G. Jones*, the Chairman of the Urban District Council, and Mr. *J. Grace*, a member of the Council, contradicted the Company's evidence; and said that the Secretary of the Company had stated that he would not press the matter of compensation.

Mr. *Frank Jones* said he had advised the Council with regard to the Company's Bill last year, and was present at the meeting mentioned, at which it was distinctly arranged that there should not be compensation. He objected to compensation clauses, and mentioned a case where a clerk in a company which was amalgamated with another, who had got just as good an appointment elsewhere, had claimed £700 compensation.

Mr. *Lees* (Messrs. Lees and Co., Parliamentary Agents for the Bill), and Mr. *Evan Davies*, the Clerk to the Porthcawl District Council, confirmed the evidence in support of the Council's Bill.

Mr. TYLDESLEY JONES, on behalf of the Council, addressed the Committee, and said that, on the evidence which the Committee had heard, they must arrive at the conclusion that there was a definite agreement come to between the parties that the compensation of officers should not form part of the terms of purchase, which was confirmed by the documents put in and initialled by the parties.

Mr. RAM briefly replied on behalf of the Gas Company.

The room was then cleared; and on the re-admission of the parties,

The CHAIRMAN announced that the Bill will be allowed to proceed in its original form—*i.e.*, without the compensation clause.

STONE GAS AND ELECTRICITY BILL.

Before the Court of Referees in the House of Commons last Tuesday, the promoters of the Stone Gas and Electricity Bill objected to the *locus standi* of the North Staffordshire Railway Company to be heard against the Bill.

Mr. SZLUMPER, for the Railway Company, first objected to the promoters' objection to his *locus* on the ground that the notice of objection was out of time. It appeared that the Railway Company's petition was deposited at 3 o'clock on the afternoon of the day Parliament rose for the Easter recess. This precluded the promoters from having the full time of eight days allowed by the Standing Orders in which to lodge notice of objection. Counsel maintained that the promoters still had three days after the reassembling of Parliament, and a notice of objection could have been lodged by the statutory time—viz., April 16—instead of which the notice was not lodged until April 21.

Mr. MOON, K.C. (the Speaker's Counsel) said that if this point were decided in favour of the Railway Company 3 o'clock on the afternoon of the day on which Parliament adjourns for holidays might become a popular time for depositing petitions.

After further discussion, the Committee decided against the Railway Company on this preliminary objection.

Mr. SZLUMPER then dealt with his application for *locus* to be heard against the Bill in Committee. He asked for a landowner's *locus*, on the ground that land in his possession would be affected by the proposals in the Bill.

It was pointed out by Members of the Committee that no mention was made in the Railway Company's petition of the Company being a landowner. But Counsel urged that a landowner's *locus* was granted under precisely similar circumstances in the Ardrossan Electric Lighting Order, 1910.

The Committee decided, however, that the Company could not

claim a landowner's *locus*, but that only limited *locus* could be asked for against clause 27, dealing with laying mains over bridges.

Mr. SZLUMPER said he would therefore make such an application, on the ground that any interference with his bridges would be a serious matter.

Mr. BALFOUR BROWNE, K.C., for the promoters, said it was not proposed to touch the structure of the bridges, but only the road over it. All that the petitioners were asking for was already covered by the Electric Lighting Clauses Act. There would be no object in giving them *locus* to ask a Committee for protection which they already had.

The CHAIRMAN said that, in the opinion of the Court, no *prima facie* case had been made out. *Locus* would be disallowed.

BAGNALSTOWN GAS PROVISIONAL ORDER.

The Gas Provisional Order (No. 1—Bagnalstown) Bill was last Thursday before the House of Commons Committee presided over by Sir EDWIN CORNWALL.

The objects are to incorporate the Bagnalstown Gas Company as a statutory concern, and to raise additional capital.

Mr. R. B. ANDERSON, the General Manager and Secretary of the Company, appeared in person; and the Carlow Urban District Council were represented by Mr. LYNDEN MACASSEY, K.C.

Mr. ANDERSON, in opening, said this was a very small Company, with an expended capital of less than £3500, and a make of about 3 million cubic feet of gas per annum. The gas-works were erected about sixty years ago; but they had been under the present management for twenty years. Gas was supplied in Bagnalstown, which has a population of 1882. The price originally charged for gas was 7s. 1d. per 1000 feet. It now stood at 5s. 6d.; and a lower price was charged for cooking, heating, and engines. The number of consumers was gradually increasing. The action taken by certain local authorities had made it almost impossible to raise capital on reasonable terms; hence the necessity for statutory powers. The Board of Trade had held a local inquiry, and petitions were lodged, but were unsuccessful. The Board of Trade had set the standard price at 5s., which the Company considered was unduly low. The petition of the Carlow Urban District Council suggested that the standard price was excessive, and that there was no necessity for the Order to be confirmed; but he maintained that this was answered by the necessity for capital.

Mr. *Anderson* then went into the witness chair, and repeated most of the information given in his opening speech. The number of consumers was 144, and the revenue of the Company £750 per annum. The Order asked for increased share and loan capital to the extent of £8000.

In cross-examination by Mr. MACASSEY, witness maintained that the 5s. at present charged was a reasonable price. This was the average price—the charge for lighting being 5s. 6d. and for heating and cooking 4s. 6d. He had originally paid about £300 for the undertaking. Asked whether there was any demand for a gas supply which he could not at present give, he said there were six street lamps, and a member of the Hospital Board had asked him to say on what terms he was prepared to supply the hospital. He was not able to say how many requests he had had from private consumers. The capital asked for would last for about forty years. He asked in the Bill that there should be a standard price. If he did not get statutory powers, he could only obtain a price from the consumers which they were prepared to pay; whereas if he got statutory powers, he could compel them to pay the price fixed under the Order.

This closed the case for the promoters.

In reply to the CHAIRMAN, Mr. MACASSEY said that the opposition of the local authority was "root and branch" opposition.

Mr. *Molloy*, the Member of Parliament for the constituency in which Bagnalstown was situated, referred to a resolution of the Council in opposition to the Bill; and other local witnesses gave evidence against the proposal.

Mr. *John Lyne* maintained that a standard price should not be allowed, but that a maximum price of 4s. should be fixed.

Major *Alexander* said that he had an electrical generating station which had been used originally for the supply of Carlow with electric light. This was at present idle; but he was quite prepared to supply Bagnalstown with electricity, which he believed he could do economically, charging at the rate of 6d. per unit. The supply could be given by an overhead main.

Mr. MACASSEY, in addressing the Committee on behalf of the Carlow Urban District Council, said Parliament had always refused to give statutory incorporation to any person for his own private advantage. They had insisted that the onus of proof was on the promoters to show that, unless they were granted statutory powers, they could not serve the public in the way they required to be served; and he submitted that no such proof had been forthcoming. There was no evidence of there being any demand for gas, nor was there any proof that this undertaking, which was bought originally for £300, had had expended upon it £3000, for which the proprietor proposed to sell it.

The COMMITTEE decided not to grant the statutory powers.

WADHURST AND DISTRICT GAS BILL.

HOUSE OF COMMONS COMMITTEE.—Tuesday, May 5.

(*Before Sir* HARRY SAMUEL, *Chairman, Mr.* FRANCE, *Mr.* ORDE-POWLETT, *and Mr.* ROBINSON.)

This Bill came up for consideration to-day on clauses. The promoters had, since the adjournment on April 22 [see "JOURNAL" for April 28, p. 273], been considering what course they would adopt, in view of the terms of the Committee's decision—that Mr. Venables should pay £1000 to Mr. Taylor for the Burwash gas undertaking.

Mr. SCHOFIELD, for the promoters, put forward a proposition that Mr. Venables should be allowed to transfer his interest in the Bill to Mr. W. A. Schultz, who, it was stated, would be in a stronger financial position to develop the undertaking.

The CHAIRMAN said he presumed in that case that, if Mr. Venables did not succeed in transferring his interest in the undertaking after all, the Bill would become a dead-letter. He would therefore have to ask the promoters to say whether they would proceed with the Bill or not in accordance with the Committee's decision.

Later in the day,

Mr. SCHOFIELD announced that Mr. Venables would go forward with the Bill as it had left the Committee.

HOUSE OF LORDS PROGRESS.

The following progress has been made with Bills:—

The Deal and Walmer Gas and Electricity Bill and the St. Anne's-on-the-Sea Improvement Bill were brought from the Commons, read the first time, and referred to the Examiners.

The Southend Gas Bill was read a second time and committed.

The Rhymney and Aber Valleys Gas and Water Bill, Reading Corporation Bill, Bristol Water Bill, and Liverpool Gas Company Bill were reported with amendments.

The Skegness Urban District Council Bill was read the third time, passed, and sent to the Commons.

Petitions have been presented against the Middlesbrough Corporation Bill by Lord Furness and the North Ormesby, South Bank, Normandy, and Grangetown Railless Traction Company.

HOUSE OF COMMONS PROGRESS.

The Skegness Urban District Council Bill was read the first time and referred to the Examiners.

The Mexborough Urban District Council Bill and the Skegness Gas Bill were read a second time and committed.

The South Suburban Gas Bill, Isle of Thanet Gas Bill, Wadhurst and District Gas Bill, Tees Valley Water Bill, and Alliance and Dublin Gas Company (Electric Supply) Bill were reported with amendments. The South Bank and Normanby Gas Bill was reported without amendment.

The Deal and Walmer Gas and Electricity Bill, St. Anne's-on-the-Sea Improvement Bill, and Abertillery Water Board Bill were read the third time and passed.

Petitions have been presented by the Wandsworth Borough Council, the Corporation of Richmond (against alterations), and the Metropolitan Electric Supply Company against the Brentford Gas Bill.

The petition of the Down County Council against the Lurgan Gas and Electricity Bill has been withdrawn.

Local Government Provisional Orders (Gas) Bill.

A Bill "to confirm certain Provisional Orders of the Local Government Board relating to Bourne and Wokingham," was presented in the Lower House by Mr. Herbert Lewis, supported by Mr. Herbert Samuel, read the first time, and referred to the Examiners.

Compulsory Co-Partnership Bill.

This Bill, "to enable the Board of Trade to compel the reconstruction of statutory and other companies and business undertakings on a co-partnership basis, and for purposes incidental thereto," was presented by Mr. O'Shee in the House of Commons.

Local Authorities and Profit Sharing.

On Wednesday Lord Robert Cecil asked for leave to introduce a Bill to enable local authorities to distribute a share of the profits made in their undertakings among the employees engaged in those undertakings. The noble lord explained that at the present moment it appeared to be illegal for a local authority to share profits with the employees. The Bill was introduced and read the first time.

The Petrol-Tax and Benzol.

Mr. VINCENT KENNEDY asked the Chancellor of the Exchequer if he would state whether the petrol-tax applied to the motor spirit known as benzol; and whether he could say what quantity of benzol was used in the United Kingdom annually, and its average price per gallon as compared with first-grade petrol.

Mr. LLOYD GEORGE wrote in reply: "No duty is at present levied on the spirit referred to, which is largely and chiefly used for general industrial purposes. The question of its taxation, if and when it comes to be ordinarily and generally used for supplying motor power to vehicles, will not be lost sight of. I have no information on the other points raised by the question."

Smethwick New Gasholder.—The Smethwick Town Council have adopted the recommendation of the Gas Committee to erect a new gasholder on the Council's land in High Park Road, at an estimated cost of £50,000.

Results at Oldbury.—At a meeting of the Oldbury District Council on Friday week, the Gas Committee reported that the quantity of gas sent out during the twelve months ended March 31 was 165,440,000 cubic feet, against 160,452,000 feet for the corresponding period of last year—an increase of 4,988,000 feet. They stated that Mr. Vincent Hughes (the Engineer of the Smethwick Gas-Works) had kindly offered to visit the works occasionally, and to allow his Assistant to do so, until Mr. Cooke was able to return to duty. Mr. C. Tomlinson (the Chairman of the Gas Committee) said that there was now a great improvement in the condition of Mr. Cooke; and if this continued, he would soon be back at his old work again. Mr. J. W. Wilson said it was a gracious act on the part of Mr. Hughes to offer his services to them, and to help Mr. Cooke in his illness in the way he had done. It showed good feeling which he was sure every member of the Council appreciated.

MISCELLANEOUS NEWS.

BRIGHTON CORPORATION AND THE GAS COMPANY.

The Question of Purchase Discussed.

A proposal that the General Purposes Committee be requested to obtain from the Borough Accountant a report as to what would be the financial effect to the Corporation if they decided to purchase the undertaking of the Gas Company was discussed at the meeting of the Brighton Town Council last Thursday.

Alderman CARDEN, in moving the resolution, emphasized the fact that some 300 local authorities owned gas undertakings, had about £30,000,000 of capital invested in them, and made about £3,000,000 every year. This was equal to about 10 per cent. on the capital invested; and the price they charged for gas was substantially lower than that charged by companies. It was late in the day to argue that these great monopolies should be in the hands of local authorities; and in Brighton the time had arrived when the Council should take into account whether it would not pay them to buy up the Gas Company. Many local authorities relieved the rates to a large amount out of their gas profits; and it was obviously better for a local authority to own these big monopolies. Of course, if they went in to-day and bought up the Gas Company, he did not say there would be any immediate cash advantage to the ratepayers, because the Company had £700,000 capital invested in the business, and the Corporation would roughly have to pay about £1,000,000 to buy up the Company, whose profits available for dividend last year were between £60,000 and £70,000. At the same time, the Corporation could borrow £1,000,000 at 5 per cent., or £50,000 a year for the repayment of interest and sinking fund, which would show a clear profit on the transaction of £10,000 for the first year. The Corporation had £2,000,000 invested in their trading undertakings; had repaid out of the profits £600,000; and in a very few more years they would have paid off the £2,000,000. He knew that some said they borrowed as fast as they paid off. But this was a silly argument; the fact being that they were not borrowing to anything like the extent they were paying off in either of their undertakings. He knew perfectly well the Corporation would buy out the Gas Company one day; and his only regret was that they were postponing the day when they would have paid off the capital charges. He wanted a report from the Borough Accountant on what would, *primâ facie*, be the financial effect of such a purchase. He did not ask the Council to carry it through if it was going to entail any loss; but he was convinced it could be done without any cost to the ratepayers of the present day, with the prospect of substantially reducing the price of gas at an early date, and of ultimately obtaining some large financial benefit to the ratepayers.

Mr. BLACK seconded. He pointed out, however, that it was the Brighton and Hove Company; and before any definite proposals were made it would be both equitable and right that Hove should be asked to co-operate in any project. Further, the Gas Company not only made gas, but an important part of all gas-works now was the sale of coke and residuals; and in respect of these they would be trading in things they did not themselves use. He had no objection to this himself, but others might have. There was one reason, and only one, why he did not regard the matter as urgent. This was on account of the factor electricity might prove to be in the situation in the future. He had very grave doubt as to whether the Gas Company would always be able to show such flourishing balance-sheets. He hoped the Council would bear in mind that if they purchased at the present moment they would probably have to pay more than would be the case in a few years. But whether they paid much or little, he thought the Corporation would find it an advantage to have more control of the roads and gas, without actual cost to the ratepayers in the way of any annual payment out of the rates.

Alderman GERVIS said Mr. Black had given them the best possible argument against the Council taking such a step as that suggested—he referred to his allusion to the coming triumphs of electricity. They were only at the beginning of what was likely to be accomplished by electricity. They were asked to purchase an undertaking which in a very short time would become derelict.

Alderman CARDEN: How short?

Alderman GERVIS: Before those millions you refer to are paid off. Now was the worst time to buy. Further, they would not in any case get the anticipated profit—they would begin raising wages, there would be a request for up-to-date machinery, and so on. But his chief objection was that electricity was in its infancy, and was going to develop beyond their utmost dreams.

Mr. WELLMAN asserted that it would be impossible for the Accountant to say what profit they would get. He added that he did not consider the concern would be so efficiently managed as under private control. Again, it was better for the public as consumers to have these two undertakings, electricity and gas, in active competition, rather than for both to be under Corporation control. He also alluded to strikes of employees at Leeds and Blackburn, and said they did not wish to risk trouble from a similar cause by increasing the number of their employees.

Mr. HEUN supported the motion, as he considered it desirable they should have all the knowledge possible on the question.

Mr. TINDALL hoped the Council would not acquire the undertaking. So long as it was owned by a private company "they got decent civility and promptitude, instead, he said, of being treated as if they were dirt by haughty bureaucrats who sat in offices."

Mr. J. SMITH declared that the generality of their customers were treated in the same way as he himself was treated—unless they themselves did not know how to behave.

Mr. CANE declared they proposed putting an impossible task upon the Borough Accountant. How could any man say what would be the effect of the purchase without knowing what the owners would be willing to sell at?

Alderman CARDEN, replying to the discussion, remarked that one would think no corporation had ever bought a gas company out before, whereas there were numbers of such cases. An expert in these matters could readily tell roughly how much the Corporation would have to pay in buying out such a concern. As to whether electric light would wipe out gas, he pointed out that the Gas Company's accounts again showed a considerable advance on the preceding year; and their business was going up instead of down. And so it would be. The Gas Company had their mains in outlying districts, which the electric light undertaking did not at present touch; and the electric light undertaking only had a fraction of the business in Brighton. There would always be a demand for gas as well as for electricity. The Gas Company were undoubtedly straining every nerve to keep up their dividends and postpone the day when they would have to lower the price to consumers. The Council were there in the interests of the consumers, however. He declared the undertaking could be acquired and successfully run. The Corporation undertakings were run as well as those of any company.

The motion was carried by 19 votes to 13.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly Ordinary General Meeting was held last Tuesday, at the London Offices, No. 21, Austin Friars, E.C.—the DEPUTY-CHAIRMAN (Mr. Arthur Lucas) presiding.

The DEPUTY-CHAIRMAN: Gentlemen, owing to Sir Charles Jessel's sudden indisposition, and to his absence by the strict orders of his doctor, I regret to say that it falls to my duty to take the chair to-day. I am sure you will join with us in hoping sincerely that Sir Charles will soon recover his health, and be able again to preside at our meetings.

The SECRETARY (Mr. Robert W. Wilson) read the notice calling the meeting, the Auditors' report, and the scheme for the appropriation of the profits. The scheme is as follows:

Scheme for Division of Profits of Half Year ended Dec. 31, 1913.

	£	s.	d.
Balance brought forward from last half year . .	42,747	4	2
Profit resulting from the workings at the stations and dividends on investments, less interest on debenture stock and the charges on account of depreciation and income-tax	232,988	3	7
	£275,735	7	9
	£	s.	d.
Dividend of 4½ per cent. for the half year . . .	222,300	0	0
Credit to pension reserve	40,000	0	0
Balance carried forward to next half year . . .	13,435	7	9
	£275,735	7	9

THE EXTENSION OF BUSINESS AND OF MAINS.

The DEPUTY CHAIRMAN: Gentlemen,—The half year upon which the Directors have to report to you to-day has been, from a proprietor's point of view, a singularly uneventful one; and there is, therefore, not much to say about it which would greatly appeal to you. During the half year, the weather was exceptionally open and mild, particularly during the months on which we depend for a largely increased consumption. The result was, that while the percentage of increase in the consumption (4·47 per cent.) may be looked upon as satisfactory, it was a lower figure than we had anticipated, and was also less than the percentage of increase shown in the second half year of 1912, when it was 6·37 per cent. What the half year was remarkable for, however, was the unusual length of mains laid, due chiefly to the extension of the Association's business in the suburbs of the towns in which the Company's works are situated. Thus, at Antwerp, where numerous suburban areas have been connected with the Association's system of mains, 27 miles were laid; at Berlin, 20 miles; Brussels, 18 miles; Hanover, 12 miles; and at Flushing, 19 miles. This last, although a comparatively small station, has recently extended its system so as to include practically the whole of the Island of Walcheren, with the exception of the chief town of Middelburg, where the gas-works are the property of the Municipality. The result of this policy of extension outwards, which has been pursued for some little time past, is reflected in the meter consumption, which increased in the half year by 10 per cent. at Antwerp, by 10 per cent. at Brussels, and by 13 per cent. at Flushing. At Berlin, where the increase shown is only a fractional one (less than 1 per cent.), other causes over which the Association had no control—such as, for instance, a reduction in the consumption in the inner city caused by the removal of residents to districts supplied by the town, or else to places further out than those served by the Association—have counterbalanced the increased consumption in the suburbs. At Hanover, the increase in the meter consumption is also not a large one, but is, in view of the circumstances of the weather, &c., fairly satisfactory. This explanation of the small increase in the consumption at Berlin is supported by official statistics published in the Berlin papers last October, according to which the population of Berlin proper decreased by over 40,000 between February and October, 1913; while the number of inhabitants in the suburbs did not increase to anything like the same extent—*i.e.*, by only 28,000.

AN INDISPENSABLE ITEM IN EVERY HOUSEHOLD.

The increases of consumption which occurred at the various stations must not, however, be attributed to the suburban extensions of mains alone. The various propaganda departments instituted of late at the Association's stations have shown commendable energy in pushing the use of gas, with gratifying results; and it is to be hoped that, when their methods are further developed and perfected, the increase in the consumption of gas—if not for lighting, at least for heating, hot-water supply, and other purposes, will be still more marked. It must be admitted that, nowadays, with the great improvements and economies introduced in electric lighting, it is more than ever necessary for suppliers of gas to use their utmost endeavours to make up for any decrease

in the use of gas for lighting purposes by popularizing and extending the use of gas for cooking, heating, and other purposes. It is to this end that our propaganda departments have been established; and we believe that, with the energy and perseverance with which our representatives are pursuing the object in view, we shall succeed in making gas an indispensable item in every household. As an instance of the success achieved in this manner in one direction only, I may point out that, in the districts supplied by us in Berlin, no fewer than 79,000 gas-irons were sold by our show-rooms in the years 1911, 1912, and 1913, and we are now endeavouring to induce our customers to adopt for heating purposes gas-fires similar in type to those used in England, but modified to meet German customs and requirements. It must not be forgotten, however, that, gratifying as are the results so far achieved in augmenting the consumption of gas, the increased consumption shown is not reflected to an equal extent in the profits; for the reason that, as stated above, although the lighting consumption increases steadily, if slowly, the additional consumption secured consists for the most part in gas used for purposes other than lighting, which is supplied at a considerably lower price, with a smaller margin of profit. This being so, we may congratulate ourselves that the increase in the consumption at our German stations has not necessitated any extension of our producing plant. But there is no doubt that, should the increase continue, we shall have to contemplate, when business generally improves, a somewhat large expenditure to provide plant to meet the demands both of our new and of our old districts.

COAL AND RESIDUALS.

Upon the occasion of the last meeting, the Directors were able to report a record half year in respect to profit earned. But, in prophesying at the previous meeting, in May, that this would probably be the case, Sir Charles Jessel, you will remember, pointed out that there was a rock ahead in the form of an increase in the price of coal, which would adversely affect our profits. Sir Charles was right. We have in the past half year been obliged to carbonize coal bought at an appreciably higher price than that contracted for three years ago. Prior to the half year under review, the Association had been enjoying the benefits of the contracts concluded at low prices in the year 1911. During the past year, fresh contracts had to be made at the higher prices then ruling; and, although we by no means paid top prices, the effect of these new contracts is reflected in the average cost of coal delivered on the works, which, as the report mentions, shows the large increase of 1s. 8·56d. per ton over that of the corresponding half year of 1912. As you will see in the balance-sheet, the profit of the half year is lower than that of the corresponding half year—the difference amounting to £3271; and you may accept it as a fact that this reduction of profit is wholly and solely attributable to the high prices which had to be paid for the coal purchased last year. Fortunately, the period of inflated coal prices appears to be coming to an end. Since the beginning of the year the fall in the price of English coal has amounted to about 1s. 6d. per ton; and the various contracts which have been concluded for our requirements in English coal this year represent a reduction upon those of last year of about an equal amount. To enable you to appreciate the effect which high coal prices have had upon the accounts of the past half year, I would mention that the total cost of gas coal and fuel increased by as much as £76,560. Against this heavy additional outlay, the value of coke, tar, and ammonia improved to the extent of only £43,855—leaving a net increase, therefore, upon coal and fuel of £32,705. That the reduction of profit is not greater than that shown by the balance-sheet is due to the healthy expansion of the business shown by the figures given in the report.

THE BALANCE-SHEET AND THE PROFITS.

Turning to the balance-sheet, you will have noticed that the total amount of profit available for appropriation is £275,735—a decrease of £5132 upon the amount available at the same date of 1912. The Board propose to appropriate this profit by distributing a dividend of 4½ per cent., which will absorb £222,300; by placing the usual quota to the pension reserve, £40,000; and by carrying forward a balance of £13,435. With regard to the other items in the balance-sheet, there is a reduction in sundry creditors of £94,083. During the past year, we have paid off the second instalment (£146,000) of the premium payable to the town of Hanover upon the recent renewal of the contract. On the other hand, the liabilities to trade and other creditors are about £50,000 higher, principally on account of coal, and of the larger quantity of general stores in hand. On the right-hand side of the balance-sheet, the items works, mains, and land have been affected by the liquidation of the Association's business at Aix-la-Chapelle; and the balances of the accounts at the two dates cannot be compared on an equal footing. The increase in the value of the stocks of coal on hand is £61,343. This increase is attributable to the fact that the quantities of coal on hand at the close of the half year were larger by reason of our anticipations of increased consumption not having been fully realized, and by reason of precautions against threatened strikes. These stocks were also of higher value than those at the corresponding date of 1912. The same applies to residuals, in which the increase is £32,054. This is due to the larger quantity of coke on hand, and to its higher average value. General stores represent an increase of £34,907, which is chiefly for mains, &c., at the Belgian stations. The total cash in hand is lower to the extent of £123,129; but, on the other hand, there is an increase in "loans to subsidiary companies" of a slightly higher amount—viz., £145,177. Similarly, the loans to brokers in London are £89,000 higher; but in sundry debtors there is a decrease of £227,477. This is due to instalments having been paid by the towns of Aix-la-Chapelle and Vienna for the works and mains, land, &c., sold at these stations. The account "freehold property in London and abroad" exhibits an increase of £6695, which is mainly caused by the purchase of additional premises adjoining the chief offices at Brussels, and premises for a show-room in the suburbs of Antwerp.

WAR AND MILITARY TAXATION.

At the last meeting, the Chairman made special reference to the new German war tax, and to additional taxes imposed for military purposes in Belgium. As regards the former, I am not in a position to supplement the information then given to any very great extent; for, although the conditions on which the tax is to be raised have been issued, and our assessment has been made out accordingly, the actual amount which the Association will have to pay has not yet been fixed. But we expect to hear shortly of the definite amount of the Association's contribution. This we shall be able to tell the shareholders at the next half-yearly meeting. As regards the Belgian taxes, the half year under review has had to bear its proportion of them; and we estimate that the workings of our Belgian stations have so far been affected by these taxes to the extent of about £3000 for the whole of the year 1913.

LONG DIRECTORIAL SERVICE.

The Chairman also referred at the last November meeting to Mr. Horsley Palmer's length of service as a Director. Sir Charles Jessel's anticipation that Mr. Palmer would beat his predecessor's (Mr. John Wilkin's) record of nearly 39 years on the Board, has been realized, for on the 21st of this month, Mr. Palmer completed 39 years' service as a Director. This term, added to the length of service of Mr. John Wilkin—viz., 38 years and 10 months—gives a total of all but 78 years; and as the Association was founded in 1824, the united consecutive terms of service of these two Directors cover nearly eight-ninths of the existence of the Association. I thought this personal note would be of interest to the older shareholders who have been acquainted so long with Mr. Palmer; and no apology is necessary for introducing it at the end of my speech. This, Gentlemen, is all that I have to say to you to-day; but before putting to you the formal resolution for the approval and adoption of the Directors' report, and of the scheme for the appropriation of the profits, I shall be glad to answer any inquiries that you may wish to put to me.

There being no inquiries,

The DEPUTY-CHAIRMAN said he was sincerely obliged to the proprietors for not putting any questions to him, as this was the first occasion on which he had had the honour of occupying the chair at a meeting. He then formally moved the adoption of the Directors' report and the scheme for the appropriation of the profits.

Mr. J. HORSLEY PALMER (who was received with applause) said he had the greatest possible pleasure in seconding the motion, because on so many occasions in years gone by he had had the gratification of proposing it.

The motion was unanimously carried.

THE DIVIDEND.

The DEPUTY-CHAIRMAN then proposed the declaration of the dividend as recommended in the scheme for the appropriation of the profits.

Mr. HORSLEY PALMER seconded the proposition; and it was unanimously carried.

ELECTION OF DIRECTORS AND AUDITORS.

The DEPUTY-CHAIRMAN said the next motion was one which, he was sure, the proprietors would unanimously agree to. It was that Sir Corbet Woodall be re-elected a Director of the Association. It was always a mystery to him (Mr. Lucas) how Sir Corbet found time to carry out his multifarious duties so efficiently as he did, and very much to the advantage of the Association. They owed a deep debt of gratitude to him for the great professional experience he had brought to bear upon their affairs during the past and former years. He was sure the motion would be carried with enthusiasm.

Mr. HORSLEY PALMER seconded the motion. He did this with very great pleasure, because he was associated with Sir Corbet in other concerns of a similar nature; and he found that, wherever they met, Sir Corbet was always ready to throw the whole of his great knowledge of gas matters into the business. He did even more for the Association, because it was not like a Company situated in England; and Sir Corbet frequently travelled abroad, and went great distances, for their benefit.

The motion was very cordially carried.

The DEPUTY-CHAIRMAN said he had next to propose for re-election Mr. Hugh Goodwin Newton, who was one of the most industrious members of the Board. At the Board meetings, he always went through the accounts. But he was not an account-book worm. He also visited their stations; and when he did this, he wrote admirable reports, which his colleagues read with great interest.

The Hon. Sir E. CHANDOS LEIGH, K.C.B., K.C., seconded the motion, which was heartily agreed to.

The DEPUTY-CHAIRMAN then moved that Colonel H. Le Roy Lewis, C.B., D.S.O., be re-elected a Director. Since Colonel Le Roy Lewis had been a member of the Board—some ten years now—he had given a large amount of time to the affairs of the Association, and had devoted his great abilities to its welfare in a remarkable degree.

Mr. ROBERT TINDALL seconded the motion; and it was also cordially passed.

Proposed by Mr. BERNARD F. HARRIS, and seconded by Mr. DENDY MARSHALL, Mr. T. Bromhead Bassett, the retiring Auditor, was re-appointed.

VOTES OF THANKS.

Moved by Mr. A. L. BIRNSTINGL, and seconded by Mr. J. PICKUP, a hearty vote of thanks was passed to the Deputy-Chairman for presiding, and to the Chairman and Directors for their services during the past half year.

The DEPUTY-CHAIRMAN said on behalf of their absent Chairman, his colleagues, and himself, he thanked the proprietors for their kind vote. They hoped the success of the Association would be as great in the future as in the past. Anyway they would all use their best endeavours in doing their duty.

Mr. HORSLEY PALMER said, they could not separate without acknowledging the services rendered to the Association by the officers and their staffs. Mr. Wilson was known to most of the proprietors as one of the ablest Secretaries to be found in the City of London. Mr. Wilson had, if he might so put it, risen from the ranks, because, when he (Mr. Palmer) first joined the Board, their Secretary occupied a humble position in the office. But by his knowledge of business, by his facility for learning languages, and various other good points, he had raised himself to be Secretary of the Association, and filled the

position with the very greatest success. They were also indebted to their officers on the Continent. Some of them had names that were well known to the proprietors—such, for instance, as Mr. Körting, of Berlin. Their officers on the Continent, and their staffs, all deserved the thanks of the proprietors; and he accordingly begged to move a vote of thanks to them.

Sir CORBET WOODALL said he seconded the motion with very great pleasure. The observations the Deputy-Chairman had made in the course of his address would give encouragement to those who knew how much of the success of the Association rested with their representatives and men on the Continent. Mr. Lucas had spoken about the altered condition of things that obtained now from what existed ten years ago. The work of the Engineers was much more strenuous now than it was then. He might say the same of the work of the Secretary and staff. The increase in the cost of coal and materials, and the increase in the cost of labour, added to the weight of responsibilities; and the striving to maintain and to extend business was far keener now, and became keener from year to year. However, to know that, in spite of the adverse circumstances of last half year, the profit of the Association had only been diminished by some £3000, while (if he remembered rightly) the net cost of coal alone had increased between £30,000 and £40,000 was fair evidence that the adverse trading circumstances were being coped with in a successful and able manner.

The motion was heartily agreed to.

The SECRETARY, in his own name, in those of the Engineers, and of the members of the staffs at the various stations and in London, thanked the mover and seconder for their appreciative words, and the proprietors for their cordial endorsement.

SOUTHAMPTON GAS COMAPNY.

The Half-Yearly General Meeting of the Company was held at the Offices last Wednesday—Captain A. J. CORSE SCOTT, J.P., in the chair.

The CHAIRMAN, in moving the adoption of the report and accounts, said he did so with great pleasure, as, notwithstanding the high price of materials, the accounts showed that the profit earned was sufficient to allow the payment of the maximum dividend of 5 per cent. per annum, and to increase the balance carried forward. Taking the accounts in order, a sum of £10,397 had been charged to capital account, £6455 being a further payment in respect of the new retort-house and plant, £3543 for additional meters, cookers, fires, and other apparatus fixed during the half year, and £399 for the cottage adjacent to the Coliseum; while £1665 had been written off for depreciation. The new retort-house was now working, and practically complete. Turning to the revenue account, the cost of coal was responsible for an increase of £6482 over the corresponding period of 1912, partly due to more coal having been used, and also to the increase in the price. The sale of gas, with the rental of meters, cookers, fires, and prepayment installations, showed a very satisfactory increase. The returns from residuals were also higher; but more had been made and sold, prices being lower. One unsatisfactory feature was the continued decrease in the returns from public lighting. In four years the sales had dropped more than 20 million cubic feet. This was equivalent to the loss of about 2000 customers to the Company; and, so far as could be seen, no one had benefited by the change. The ratepayers were still paying the same amount for the lamps now electrically lighted, and, in addition, the cost of the installation, which had to be paid for. The Company had, however, obtained a large increase of business in other directions, which had more than compensated them for the loss of public lighting. The net result of their trading for the half year was a profit of £1000 more than in 1912. As to the future of the Company, everything pointed to continued prosperity. Fresh fields of supply were being opened, and the officials were actively engaged in developing new business wherever possible. He had already mentioned the completion of the new retort-house; and improvements were also being made in other parts of the plant at the works. The inhabitants at Lyndhurst had approached the Company for a supply of gas. The district was being canvassed, and if the results proved satisfactory the mains would be extended. The central show-rooms having proved of such great value, the Directors had under consideration the provision of branch show-rooms in the outer districts.

The DEPUTY-CHAIRMAN (Mr. J. C. Moberley, M.A.) seconded the motion; and it was carried.

The maximum dividend having been declared, the retiring Directors and Auditor were re-elected.

On the motion of the CHAIRMAN, seconded by Mr. J. CASH, the salary of the Secretary (Mr. J. R. H. Jacobs) was increased by £150 per annum.

Mr. JACOBS expressed his thanks, and said his only object was to do the very best he could for the Company, and see that the service of gas was made as perfect as possible.

Thanks were accorded to the Chairman, Directors, and staff; and the proceedings closed.

Suffragettes' Attempt on a Reservoir.—An attempt, which was fortunately unsuccessful, has been made to damage one of the most important reservoirs of the Dewsbury and Heckmondwike Water Board. A reward of £100 has been offered for information as to who was responsible for placing a charged bomb, with a fuse attached, under the valve-house; and the finding of some suffragette literature near the spot appears to offer a clue. The placing of the bomb where it was discovered shows that the person responsible knew exactly where most damage could be done with the least force. Had the fuse not failed to act after being fired, and the valve-house had been wrecked, the reservoir would have been emptied; and there is no telling what damage to property, and even life, might have ensued. A suggestion was made by a member, when the matter was discussed by the Board, that pressure should be brought to bear on the Home Secretary to adopt measures for the protection of other reservoirs throughout the country.

ELY GAS COMPANY'S ELECTRICITY SCHEME.

Provisional Order Inquiry.

A Board of Trade inquiry was held at Ely last Tuesday week, by Mr. C. PELHAM, regarding an application by the Ely Gas Company for a Provisional Order to enable them to supply electricity in the city. Much interest was taken in the proceedings, which lasted for nearly five hours.

The Company were represented by Mr. G. HUME (instructed by Messrs. Monier-Williams, Robinson, and Milroy); and Mr. ARTHUR ALLEN appeared for the Ely Ratepayers' Association.

Mr. HUME explained that the Company were applying for power to supply electricity within a stated area. The price of gas was 4s. per 1000 cubic feet, less 5 per cent. discount; and there were approximately 480 consumers through ordinary meters and 660 through slot meters. It was proposed to supply electricity within a radius of half-a-mile of the west gates of the cathedral. The area included practically all the town part, but not the cemetery or workhouse.

The INSPECTOR asked why the whole of the urban district was not included. [A question which was greeted with applause.] When they were starting a new scheme, it seemed to him that they ought to include everything that was perfectly urban.

Mr. HUME replied that the urban district covered a very big area. In regard to the workhouse, he was told it was only within the last few years that it had been lighted with gas; but he appreciated the point which had been raised. He was instructed that it was not possible for works to grow up outside the area named.

The INSPECTOR said it was an odd thing to leave out the railway station.

Mr. HUME answered that he believed the Company would have no objection to going farther afield. The consent of the Board of Trade had been given to the name of the Company being changed to the "Ely Gas and Electricity Company." The Company had also passed the necessary resolution to enable them to carry on the work of generating and distributing electricity. With regard to the local authority, they had refused to give consent to the granting of the Order; but they were in the position that they had never attempted themselves to apply for an Order to supply electric light, though they had an opportunity in 1904 of acquiring one from the Southern District Electricity Corporation. This body attempted to sell their Provisional Order to, among others, the local authority. Nothing came of the Order; and it was revoked by the Board of Trade. Proceeding, he pointed out the facilities possessed by the applicants for running an undertaking of this kind. They wished, as many other companies had done in various localities, to combine the two undertakings. He was rather surprised, under all the circumstances, that there should be so strong an opposition on the part of certain sections in Ely, because it seemed to be the only opportunity the district had of obtaining electric light at a reasonable rate.

The INSPECTOR explained that there was a certain disadvantage. They trusted to the competition of gas to keep down the electric light rates.

Mr. HUME: Not in small areas, where there is no big demand.

The INSPECTOR: It is well concentrated.

Mr. HUME: In spite of that it is very thin. The experience has been, where in small areas the gas company supply electricity at the same time, the tendency is for the price of gas to drop; and certainly there has been no tendency for prices for electricity or gas to be in any way inflated.

The INSPECTOR said the price of gas seemed to him very high.

Mr. HUME replied that it compared favourably with a whole number of companies. Alluding to certain objections, he said the people seemed to overlook the fact that the land belonged to the Gas Company, and they were absolutely at liberty to build on it for gas purposes. He explained that it would be better for the locality if the electric light station was put up there. The proposal was to do the lighting at night time and in the early morning from accumulators, so that the neighbourhood would not be much disturbed. He criticized at some length the objections put forward by the Ratepayers' Association, and said that, on the question of monopoly, as the Inspector knew, the holders of Provisional Orders were simply tied round with all sorts of restrictions. The local authority and other companies were free to come along and apply for Provisional Orders. It was very difficult to really appreciate what was the basis of the opposition which was being entered to the application. It had been suggested that the Gas Company were simply trying to block the road, by taking over electricity, and thus preventing someone else coming in, and that the Company were not taking it over with the intention of working it properly and making a success of it. But this would be a foolish attitude.

Mr. *T. A. Guyatt* (Secretary and Engineer to the Company) said the charge for gas for power purposes was 3s. 4d. per 1000 cubic feet, less 5 per cent. Realizing that there was a demand for electricity in the place, and seeing that nobody else appeared to be likely to take it up, his Company thought it would be in the best interests of the city generally to apply for the powers themselves, and to supply the commodity at a reasonable price. The shareholders were fully in agreement with the application; and if the Order was granted, the Company would lose as little time as possible in getting to work. There were a few private installations in the city at the present time. There were 82 separate owners within a radius of 300 yards of the gas-works, and only five had entered objections to a generating station being erected at the works. One of these had since withdrawn. There would be more nuisance from the retort-house than from a generating station. He mentioned some of the towns where the gas company ran electric light, and pointed out the advantages of the one company having both undertakings. His Company had reduced the price of gas on six different occasions; the last being about four years ago. An increase in the charge for public lighting was on account of the rise in the price of coal. The charge was formerly 60s. per lamp per annum, but now it was 63s. Quite recently they had raised the wages.

Mr. ALLEN: How many of the shareholders live in Ely.

Witness: I should not like to say off-hand the exact number. Over twenty live in the city.

Mr. ALLEN asked if the increase in the cost of public street lighting was made in consequence of the opposition of the Ratepayers' Association and the majority of the Urban Council.

Witness: Certainly not. It was entirely due to the increase in the price of coal.

Mr. ALLEN: There has been a little ill-feeling between the ratepayers and the Urban Council and the Gas Company?

Witness: There has been a certain amount of opposition; but I do not admit there has been any ill-feeling on our side.

Mr. *A. H. Dykes*, partner in the firm of Messrs. Hancock and Dykes, said, on the subject of combined electricity and gas works, it was quite obvious that, if they combined the two, they must very largely reduce the standing charges, not only of the electricity department, but of the gas department as well. This had been amply borne out by gas companies which had been running both concerns. In Ely there was not sufficient scope for an independent company to run electricity. The effect of introducing electric light into the town would not be to restrict the use of gas. An electric light station was less objectionable than any extension of gas-works. It was proposed to erect an ornamental brick building in Ely, containing an engine and dynamos; while another part of it would contain the accumulator for storage. There would be no smoke or fumes. The outlay for stations and mains he put at £8640.

Replying to Mr. ALLEN, witness said the Company would be able to start under much more favourable auspices than a municipal undertaking.

Mr. *W. A. Schultz*, Chartered Accountant, said his association with gas and electric light undertakings extended over a period of thirty years. He gave particulars of the working of the electric undertaking at Ascot, where the Gas Company ran both lighting concerns.

Mr. HUME: Are you of opinion that the maximum price here, of 7d. per unit, is reasonable?

Witness: The maximum price is reasonable. Proceeding, he pointed out that the Gas Company were in a very favourable position. They had given the very best to the consumer. They had supplied gas at 4s. for some time, and had not taken the whole dividend they were entitled to. The area of half-a-mile mapped out for the supply of electricity was merely called the compulsory area, being the part where the Company must put down their mains in two years. In small undertakings such as they had here, it would be far better for the consumer and the city to have both concerns in one hand.

This concluded the case for the applicants.

THE OPPOSITION.

Mr. ALLEN said the Ratepayers' Association maintained that this was an attempt to override the Urban Council. He handed in a resolution passed at a mass meeting held the previous day, petitioning the Board to refuse the Company's application for a Provisional Order to supply electricity, and desiring the Council themselves to take steps to secure an Order for the purpose of starting an undertaking. He said there were nearly 2000 ratepayers in the city; and 300 were present at the meeting, and voted for the resolutions.

The INSPECTOR remarked that he could not understand why the Urban Council were not officially represented that day.

Mr. *Frank Green* said that, if the Gas Company had treated the Council in the same way as other applicants had done, and had sent in prices and had been prepared to give information and consult with the local authority, the matter might have been arranged without an inquiry. The consent of the Council was refused by two votes. When the Southern Electricity Corporation gave notice that they were prepared to surrender their Order, the matter was not discussed in Council. He supposed no member thought about the Council taking up the Order. The Council, he believed, were still a class of people who did not believe in municipal trading. There might, of course, be a majority for it; but it had never been put to the test. He thought some terms might have been arranged between the Gas Company and the Council, if the Company had attempted to meet the objections of the Local Authority.

The INSPECTOR: I must say your evidence weakens the opposition.

Witness said that if the Board granted the application, he hoped they would insist upon the Company coming to terms whereby electricity would be supplied at the lowest possible price.

Other witnesses then gave evidence, including a councillor, whose answers led

The INSPECTOR to say he wanted very much to know why the Council were not opposing that day. It seemed a most extraordinary position they had taken up. They refused their consent to the application, and nobody came to present their views.

Mr. *Nash* (Secretary of the Ratepayers' Association) read a statement to the effect that the Association desired to see electricity introduced, but wished it to be from a source likely to bring about competition with the Gas Company.

At the close of the inquiry, the Inspector visited the proposed site for the works.

ELECTRIC LIGHTING SCHEME FOR AYLESBURY.

Proposal to Borrow £21,323—Public Opposition.

At the Town Hall, Aylesbury, on the 1st inst., an inquiry was opened by Mr. T. C. Ekin, M.Inst.C.E., in regard to an application made to the Local Government Board by the Urban District Council for sanction to the raising of £21,323 for establishing an electricity supply undertaking. Great interest was taken in the proceedings, which extended over three days, in view of the opposition which has been manifested to the scheme. Among those in attendance were Mr. C. C. Chilton, the Chairman, and Mr. G. Lane, Assoc.M.Inst.C.E., the Engineer and Manager, of the Aylesbury Gas Company. Mr. R. J. Drake (instructed

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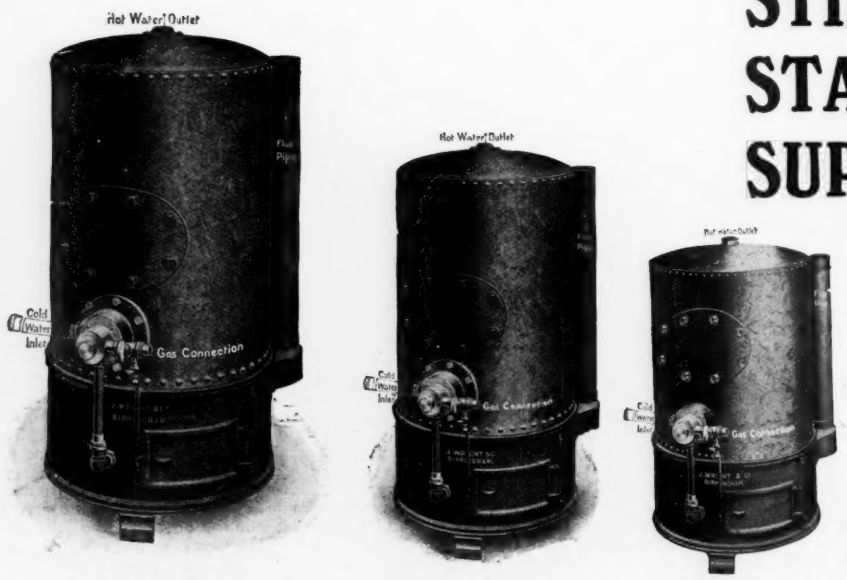

Stock sizes:—40 Gallon. 20 Gallon. 10 Gallon.

John Wright & Co., Eureka Works, Birmingham.

by Mr. Percy A. Wright, the Clerk to the Council) appeared in support of the application; Mr. Geoffrey Garrod represented the Aylesbury Bifurcated and Tubular Rivet Company, and Sir Ryland D. Adkins certain ratepayers, who opposed it.

Mr. Drake gave particulars in regard to previous unsuccessful attempts by the District Council to introduce electric lighting, and said the present movement was the result of an offer made by a well-known resident—Mr. Thomas Field—to give them a site if they would apply for a Provisional Order and carry out the supply. On Jan. 1, 1912, the Council decided to do this. The only objection to the scheme was made by the Gas Company; and a special clause to meet it was inserted in the Order, which was duly confirmed. The question was submitted to the ratepayers in the form of a *referendum*; and there was a majority of 1013 in its favour. Mr. W. A. Turnbull was appointed Resident Electrical Engineer; and Messrs. Kincaid, Waller, Manville, Dawson, and Co., Consulting Engineers. Mr. Manville prepared a scheme, and on Nov. 10 last the Council decided to forward the plans, specifications, and estimates in connection with it to the Local Government Board, with an application for their consent to a loan of £20,800—the amount up to then. It was subsequently decided to purchase a site adjoining the Canal Wharf, at the rate of £700 per acre; Mr. Field's offer having previously been withdrawn. At an election which took place, the candidates favouring the scheme received 2777 votes, and those against it 652 votes; showing a majority of 2125. The Council therefore thought their proposal had the support of the town; and he submitted that there would be an overwhelming volume of evidence in favour of it.

Evidence in support of the application having been given by the Chairman (Mr. C. F. Adams) and the Vice-Chairman (Mr. G. J. Thrasher) of the District Council and others, Mr. E. Manville submitted particulars of the scheme, and expressed the opinion that there would be a net surplus of £245 on the first year's working. Mr. W. A. Turnbull (the Resident Electrical Engineer) said he had made a personal canvass of the town, and 149 prospective consumers had notified, by signing forms, their intention of taking current. He estimated that the current for lighting and power, with meter-rentals, would produce £2386. Mr. A. E. Jackson, Superintending Engineer to Messrs. Kincaid, Waller, and Co., said he was of opinion that the undertaking would be a great advantage to the town, and that the site selected was an eminently suitable one. Mr. W. E. Brandreth, Manager of the High Wycombe Electric Lighting Company, said he had had a fairly wide experience of electric light schemes, and there was no case, so far as he was aware, of an installation being detrimental to the gas undertaking; it had generally been the other way. At High Wycombe the progress of gas had been exceptional since his Company went there.

Other witnesses having been called in support of the application, evidence was given in opposition. Mr. T. R. Seaton, the proprietor of the George Hotel, said that he considered the gas supply in Aylesbury adequate to meet the requirements of the inhabitants, and that if the electric lighting scheme were proceeded with it would be a charge upon the rates. Mr. H. J. Joscelyne, the Managing-Director of the Bifurcated and Tubular Rivet Company, expressed the opinion that the financial position of the Council was not such as to make it desirable for them to ask for an additional loan, and that the prospects of the scheme being really remunerative to the ratepayers were not good. In company with others, he took steps to prepare a petition to the Local Government Board against the scheme, and it was signed by upwards of 2000 persons, about two-thirds of whom were ratepayers. He was opposed to the scheme financially and on the ground of inadequacy. He considered that £21,000 would not cover the cost of dealing with the gas-lighted part of Aylesbury.

Witnesses having spoken as to the unsuitability of the site chosen for the works, Mr. C. C. Chilton, the Chairman of the Gas Company, said he had no personal opposition to the electric light; the experience being that most gas companies had prospered in spite of it. He was opposed to the scheme in his capacity as a ratepayer and an owner of property in Aylesbury. Mr. F. P. Spicer, a member of the firm of Messrs. C. Larkin and Co., Limited, criticized the details of the scheme. In the course of his evidence, he said it had been prepared on a cheese-paring basis; no margin having been allowed for any of the ordinary contingencies of working. He did not agree that there would be a surplus of £245 on the first year's running; he put it at £8. If more money had to be spent on the site than the sum allowed, this small balance would be wiped out altogether.

Sir Ryland Adkins, addressing the Inspector, said the issue before them was really whether the loan of £21,000 was, under all circumstances, a justifiable sum to be levied on the ratepayers of Aylesbury. If the scheme became a burden, hundreds of hard-working and struggling people stood to lose by it. His case was that in a town where there had been a widespread opposition, including the written opposition of more than half the ratepayers, it was in the public interest that the loan should not now be sanctioned, but that the enterprise should await a time when it really had behind it an overwhelming local public spirit, greater local financial resources, and improved methods which made it possible, in towns even smaller than Aylesbury, for it to be done at an actual profit. Mr. Garrod also addressed the Inspector, and asked him to say that, in a town like Aylesbury, which already had outstanding loans of £30,000, rates equal to 9s. in the pound, and a population of less than 12,000, it was not right that a £21,000 scheme should be embarked upon by the District Council, and that it was not proper to run the risk with the rates as high as they were.

Mr. Drake having replied, the inquiry closed.

Balcombe Petrol Air-Gas Company.—The petrol air-gas installation at Balcombe has been completed, and the light was turned on by the Rector, who remarked that "they were enjoying one of the latest acquisitions of scientific knowledge in which both Capital and Labour shared." One machine, sufficient for 500 lights, has been erected as a start; and five public lamps in the village.

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LAST season we introduced our 30-40 Series of Cookers. Their success has led us to feature them specially this Season. These cookers are the correct interpretation of the demand for a first-class cooker at a moderate price.

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Sliding meat hook; swing hangers; extra deep door; removable and interchangeable burners with gas and air adjusters; enamelled linings easily fitted or removed. Lifting or fixed cornice. Wrought-iron bars which will not fall out when cornice is raised. Double reversible grill, which when reversed gives an absolutely vertical flame for boiling.

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CHORLEY CORPORATION GAS UNDERTAKING.

The Gas Engineer and Manager of the Chorley Corporation (Mr. J. W. Allin) has presented to the Gas Committee his report for the year ended March 31.

Mr. Allin states that the total quantity of gas made was 191,425,000 cubic feet, against 183,669,000 feet in 1913, an increase of 4·2 per cent. The total quantity of gas sold during the year was 179,810,200 cubic feet, or an increase of 5,381,000 feet. The unaccounted-for gas was equal to 6 per cent., against 5 per cent. in 1913. The total amount of fuel carbonized was 16,215 tons, yielding 187,115,000 cubic feet of coal gas, or 11,539 feet per ton. Of carburetted water gas, 4,310,000 cubic feet had been manufactured. The gas sold was distributed as follows: To mills and workshops, 23,924,200 cubic feet; ordinary consumers for lighting, over 200,000 feet per annum, 10,832,600 feet; ordinary consumers under 200,000 feet per annum, 122,071,800 feet; engines and manufacturing purposes, 14,697,500 feet; public lighting, 8,284,100 feet—total, 179,810,200 cubic feet. Of the gas sold, 86·5 per cent. was consumed within the borough. The amount of gas sold through automatic meters was 41,981,600 cubic feet, against 37,379,500 feet in 1913. During the year there were connected 154 new consumers—43 ordinary, and 111 prepayment. At March 31 there were 4734 ordinary, and 4825 prepayment consumers. The number of cooking appliances in use at the same date was 5462; and of gas-engines, 134.

The report was adopted.

DEWSBURY GAS-WORKS EXTENSIONS.

Laying a Main Outside the Area of Supply.

An important point was raised in the course of a Local Government Board inquiry at Dewsbury, into an application by the Corporation for sanction to borrow £21,000 for gas-works improvements and extensions. This sum was made up of £6000 for purifying plant and a high-pressure gas installation, £10,000 for new meters, and £5000 for extensions of mains; and it was asked that the loan should be for the maximum period of sixty years.

Mr. R. H. Bicknell was the inspector; and he said he had been furnished by the Local Government Board with a minute to the effect that it was proposed to lay some of the mains in Whitley Upper, a district outside the limits of the area in which the Corporation had powers to supply.

The Town Clerk (Mr. Hiram Ellis) replied that the Gas-Works Clauses Act empowered the Corporation to enter into contracts to supply other authorities. The Act did not empower the Corporation to lay mains; but he contended that if they properly protected the mains by an agreement, the mains would be as much the property of the Corporation as though they were within the borough.

The Inspector: Your powers are restricted to supplying in bulk; and the mains must be laid by the authority taking the supply. I suppose that in the agreement you should say they are to lay the mains.

The Town Clerk: We have entered into an agreement for us to lay the mains. The Act does not expressly prohibit the Corporation from laying them.

The Inspector: It strikes me that that is exactly what it does; and I do not see any way in which the Local Government Board can help you out of the difficulty.

Eventually Mr. Bicknell intimated that he would not recommend the Board to make any deduction from the suggested expenditure of £5000 on new mains; but none of the money must be used for laying mains outside the borough.

With reference to the new purifying plant, it transpired that this had already been erected; and it was also stated that a large proportion of the sum required for new meters had been expended. The Inspector thereupon emphasized the fact that the Local Government Board do not like inquiries to be held as to work which has been carried out. He added: "We do not keep you waiting as long as we did twenty years ago; and there is really no excuse for spending so large a sum without asking for sanction." The Town Clerk explained that a Provisional Order had been secured which the Gas Committee believed at the time would give them absolute borrowing powers.

THE TREDEGAR GAS-MAINS LOAN.

Reference was made at the meeting of the Tredegar Urban District Council last Tuesday to the letter from the Local Government Board on the subject of steel and cast-iron mains, which was given in the "Journal," a week ago [p. 370].

The Gas Manager (Mr. D. W. Davies) said the statement in the Board's letter that part of the 1910 loan had been spent on Mannesmann steel tubes, whereas the loan was sanctioned for cast-iron mains, was a serious reflection on the Council, as they were charged with spending money for a purpose other than that for which it was granted. Extracts from the 1910 sanction were read by the Clerk; and in them no mention was made of any particular type of main. Continuing, Mr. Davies said that if the sanction to the 1910 loan had mentioned cast-iron tubes, he would not have dared to use steel tubes. He had never yet seen any correspondence regarding the 1910 loan which stipulated for the use of cast-iron mains only.

Mr. Davies added: "It is evident that, though the Board have had every opportunity of thoroughly considering the position in the light of the events of the past two months, the Board's attitude appears

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Heating
WARRINGTON

to be practically the same; and there is no doubt that cast-iron mains are advocated by the Board in preference to steel. The section of the Board's letter which reads, 'The Board merely stated that no payments should be made in respect of Mannesmann steel tubes out of the loan sanctioned for thirty years for cast-iron mains, as the period for which the Board would sanction a loan for steel tubes would not exceed fifteen years,' gives the Board's opinion of steel tubes as compared with cast-iron; and this opinion appears to be irrevocable. I therefore advise you to accept the Board's sanction for the loan, as already laid before you, and proceed with the works immediately."

This recommendation was adopted.

TESTING OF GAS-METERS IN THE CITY OF LONDON.

Amendment of the Sales of Gas Act (1859) Foreshadowed.

Mr. George Hume, the Inspector of Gas-Meters for the City of London, in his report for 1913, states that during the year 49,717 prepayment meters, being 51·7 per cent. of the total, were submitted for testing, as against 55,100 in 1912—showing the continued demand for this type of meter. He again points out, however, that his office does not examine, nor does its seal ensure, the accuracy of the slot attachment. But as the actual sale is based upon the consumption recorded on the index of the meter itself, which is examined and tested, both parties are protected against any error of registration.

The Inspector goes on to remark that, in the 1911 report, attention was called to the alteration in the conditions of gas supply during recent years, and the necessity for an amendment of the Sales of Gas Act, 1859, which at present is the only Act regulating meter testing. The Bill relating to the testing of high-pressure gas-meters, which is being promoted by the Corporation in the present session, will provide for the more efficient examination of this particular type of meter in the City of London; but the demand for a comprehensive amendment of the Act of 1859 remains, and is, he understands, receiving the attention of the Board of Trade.

GAS-FIRES AND LONDON FOGS.

Professor Vivian B. Lewes, the Chief Gas Examiner to the Corporation of London, in his annual report states that the gas supplied to the City by the Gas Light and Coke Company during the past year was fully equal to all the parliamentary requirements, and perfectly satisfactory in that the supply was uniform in heating and lighting value; the fluctuations being so small as to be unnoticeable under ordinary conditions of consumption.

The use of gas for fuel purposes is making steady headway, and should be encouraged as far as possible, as extended introduction of gas-stoves in place of grates consuming bituminous coal is gradually improving the atmospheric conditions, and has reduced the number and density of City fogs, in many cases caused by coal smoke, which also tends to make them more lasting and more injurious to health.

The almost universal use of the incandescent mantle for developing light by the combustion of coal gas, and consequent diminution in the use of flat-flame burners, together with the extensive utilization of coal gas for heat and power, Professor Lewes says, renders the calorific value of the gas a matter of the greatest importance to the consumer; and in this respect also the quality has been well maintained.

The gas supplied to the City has been satisfactory in respect of the amount of sulphur compounds present in it. The daily testings of the stations gave an average of less than 40 grains per 100 cubic feet.

GAS v. ELECTRICITY AT LOUGHBOROUGH.

In the impolitic attempt to exploit electricity at the expense of the gas undertaking (both being in the hands of the Corporation) matters have got into somewhat of a tangle at Loughborough; a feeling of strong dissatisfaction finding expression at the last meeting of the Council.

The Electrical Engineer then reported that an inquiry had been made as to the laying of a supply main on the York Road extension, and that he had offered to carry out the requisite work upon the owners guaranteeing to pay 10 per cent. on the capital cost, until the revenue received from the cable equalled this amount. But these terms had not been accepted. He suggested now that he should have authority to lay, free of cost, the necessary main to satisfactorily deal with the whole of the estate. He also reported that he had had under consideration a scheme for supplying cottages and villas with the lighting current at a fixed charge weekly, including the provision and maintenance of the necessary installation and the supply of current. Such a scheme, he said, was working excellently in a number of other towns; and if the Committee approved the broad principle involved, he would prepare plans. This the Committee authorized him to do.

There were some members of the Council, however, who took a different view of the project. Mr. F. W. Charles contended that the Electricity Committee could not afford to do as was suggested. They were already indebted to the rates to the extent of £8000 or £9000; and they ought to devote themselves to paying off their liabilities before embarking upon other schemes. Referring to the Highway Committee's suggestion as to the improved electric lighting of certain thoroughfares, he contended that if disappointment was felt as to the character of the illumination at present in use at the points under consideration, the Gas Committee could improve it at a less outlay than would be entailed by the Electricity Committee. To pull down certain of the gas-standards, as had been suggested, would, in his view, be a crying disgrace to the Council. He pointed out, moreover, as being of even greater importance, that

Profitable Hiring.

Problem is not only a reason-
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the gas undertaking was prepared to pay for its improvements out of revenue. The replacing of gas-standards by electric ones would put the town to great expense, damage the gas undertaking, and increase the rates. If matters had been properly dealt with in the past, much of the money that had been luxuriously spent on electricity might with advantage have been devoted to the gas undertaking, so enabling the works to be brought to a much more up-to-date condition than they were in at present. They would not then have had two municipal concerns competing to the exclusion of profit to the ratepayers. In his opinion, recent extensions of the electricity undertaking had not been required.

The recommendations of the Committee were, however, adopted.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

Mr. Alexander Wilson, the Chief Engineer of the Glasgow Corporation Gas Department, has been carrying out an interesting piece of work at the Tradeston Gas-Works in reinforced concrete, on the Coignet system. This consists of a platform for coal-trucks which are to be emptied into the coal-store. The platform is 20 feet above the ground level, and is 28 feet wide, so as to allow two lines of rails with openings between for the emptying of the coal. The total length is about 360 feet. Each span consists of four principal beams, 36 inches deep and 12 inches wide, which support a reinforced concrete slab floor 4 inches thick. The system chosen arranges for the binding together of the various round mild-steel bars with annealed wire, whether in the flooring or in the beams and pillars. In this way the proper position of the bars during the placing of the concrete is assured. A locomotive crane is to be used with a grab, so that the trucks can be loaded from the coal-store if desired. The use of reinforced concrete in gas-works is extending greatly; and in view of the deterioration of iron work which is exposed, and which cannot be easily cleaned and painted, this material is a very useful one to the gas engineer. In so many places in a gas-works the iron or steel work is greatly corroded by the steam given off in the quenching of the coke; and if the metal can be incased in concrete, and this oxidation avoided, the life of the structures in a gas-works will be much extended. The adoption of the vertical retort, with its heavy load on the foundations, has necessitated the use of ferro-concrete, in the form of rafts, so that the load can be spread over a large surface. In some works the entire buildings have been erected of this material, and considerable saving in expense secured.

Mr. Alexander Yuill has had a motor-car provided for him by the Town Council, although this was not decided upon until some discussion had been held and objections made. The area covered by the mains in the district which is under Mr. Yuill's charge is considerable, especially now that the Broughty Ferry Gas-Works have been closed down and all the gas made at Dundee. This course was started about a week ago; so that the Engineer will have to travel considerable distances in the superintendence of the supply in the amalgamated districts.

Helensburgh and Mr. William Blair are to be congratulated upon the considerable increase in the consumption of gas over last year which the Gas Convener has reported. As suggested by him, the increase is no doubt due to the large amount of heating and cooking which is now being done by gas in the district. In no place is this adoption of gas heating and cooking so much appreciated as in a place of summer resort, and especially in those places which provide accommodation for families where the "lady of the house" does her own cooking. When she is on holiday she naturally prefers to use an arrangement which provides a complete and satisfactory fire for all classes of cookery in a few minutes, and the trouble of keeping up and cleaning up the ordinary kitchen grate is thereby entirely avoided. In such places the houses and apartments which have gas-cookers installed will be more readily let, and at much better prices than those where the old-fashioned kitchen fire is the only one available.

While upon the subject of cookers, the question of the class of consumer to whom they should be given free is one of importance. In Stewarton the Gas Company are offering to supply and fit-up free range-plates to those whose consumption of gas is 10,000 cubic feet or more. In many other places it has been found that the supply and fixing free of a griller has done much to bring the consumption up to considerably more than 10,000 cubic feet. To consumers of more than 10,000 cubic feet, it would seem that the cooker proper should appeal; and although this costs considerably more than the simple griller, it is a matter of opinion whether the greater cost is not remunerative in the higher consumption of gas and the greater usefulness of the complete apparatus.

Two excerpts from a local paper printed only a few inches apart in the same column read curiously: "The street illuminations in the burgh have been turned off for the summer months." A little further on: "Artificial light had to be brought into use during the daytime on Thursday, owing to the dull condition of the weather." One has heard of the turning out of the street lamps during the period when the moon is supposed to shine, whether it is to be seen or not; but to put them out when the light of the day is so bad as to require the use of artificial illumination is almost farcical.

A new form of insurance against the probable effects of a boiler explosion, not upon the boiler only, but upon the apparatus round about the boiler, is being brought before those in charge of gas-works throughout Scotland. There is no doubt that in many works where the boiler is installed in the retort-house the damage done to the other plant would be considerable; and probably a good deal of expense would have to be incurred in providing means for the temporary making of gas and the purifying of it. This matter has been before the Darvel Town Council, who remitted the point to the Gas

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Committee. The Committee reported that more retorts were required; and it was agreed to have these installed.

A member of the Aberdeen Town Council has been asking the following questions: "Was the representative of the Contractors for the uncompleted contract for vertical retorts present at the luncheon? Did he, on behalf of the Contractors, present a piece of silver plate, and to whom? What was the inscription thereon? Has the piece of silver been handed over to the Town Clerk, as custodier for the Town Council? If not, why not?" The reply was in the following terms: "As was customary on such occasions, the Contractors for the new vertical retort installation were included in the invitations to luncheon. No list of the names of those actually present at the luncheon was kept. At the conclusion of the proceedings, the Convener was presented by the Contractors for the new installation with a souvenir of the occasion. Such a presentation was not unusual on the completion of an important contract." The minutes of the Gas Committee were then approved. It is a new thing for objection to be taken to the presentation of a momento of the undertaking of a large contract, such as is here involved, being presented to the convener of a gas committee; and in view of the fact that the contract has already been let, and the presentation is made in the most open and public manner, it is difficult to see wherein objection can be found. While it is well that all precautions should be taken to prevent any member of a town council from receiving presents from contractors for the purpose of influencing business in that contractor's direction, the same objection cannot be taken when the business is already placed and the work in hand.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May* 11.

Pitch continues weak, and the present price is from 37s. to 37s. 6d. per ton net in bulk, though London sellers would not accept below the latter figure. Creosote is firm at 3¾d. per gallon net in bulk. Benzol, 90 per cent., is 1s. 2d. per gallon net, filled into buyers' packages. Toluol, 90 per cent., is 11d. per gallon net and naked. Solvent naphtha, 90/160, is 10¾d. per gallon net and naked. Anthracene is 2d. per unit, casks free. Pyridine has been done at 8s. 4½d. per gallon net into buyers' packages; and the price to-day is from 8s. 4½d. to 8s. 6d.

Sulphate continues weak, and the price could not be called above £11 5s. per ton net, into buyers' bags, for 25 per cent. quality.

Tar and Tar Products in the Provinces.

May 11.

The average values during the week were: Tar, 25s. 6d. to 29s. 6d. Pitch, London, 36s. to 36s. 6d.; east coast, 36s. to 36s. 6d.; west coast, Manchester, 35s. to 35s. 3d.; Liverpool, 36s. to 36s. 6d.; Clyde, 36s. to 36s. 3d. Benzol, 90 per cent., naked, North, 10¼d. to 10½d.; 50-90 per cent., naked, North, 10d. to 10½d. Toluol, naked North, 10½d. to 11d. Crude naphtha, in bulk, North, 4¾d. to 5d. Solvent naphtha, naked, North, 9¼d. to 9½d. f.o.b. Heavy naphtha, naked, North, 9d. to 9¼d. f.o.b. Creosote, in bulk, North, 3⅝d. to 3⅞d. Heavy oils, in bulk, 3⅝d. to 4⅛d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 0½d. to 1s. 1d. Naphthalene, £4 10s. to £10; salts, 55s. to 60s., bags included. Anthracene, "A" quality, 1⅛d. to 1¼d.; "B" quality, nominally ¾d. per unit, packages included and delivered.

Sulphate of Ammonia Prices in the Provinces.

LIVERPOOL, *May* 9.

In the absence of real support from any quarter, the market has become very depressed, and prices have continued to recede throughout the week. The demand for home consumption is practically finished, and the requirements for export have only been on a limited scale. The nearest values at the close are £11 12s. 6d. per ton f.o.b. Hull, £11 13s. 9d. per ton f.o.b. Liverpool, and £11 15s. per ton f.o.b. Leith. The weakness in the near position has had the effect of deterring many buyers from operating for future delivery, but it is reported that some business has been done over the second half of this year at about prompt prices.

Nitrate of Soda.

There is no change in either the tone of the market or the value of this article, and quotations are repeated at 10s. and 10s. 3d. per cwt. for ordinary and refined quality respectively on spot.

From another source it is reported that the market for sulphate of ammonia continues very weak, and there has been a decided drop in the values during the past few days. Outside London, makes are not worth more than £11 to £11 2s. 6d.; Liverpool, £11 17s. 6d.; Hull, £11 17s. 6d.; Leith, £11 18s. 9d.; Middlesbrough, £11 17s. 6d.

Burnley Corporation Water-Works.—At Wednesday's meeting of the Burnley Corporation, the question of the completion of the contract for the new Hurstwood works was mentioned. The original contractors for the works were unable to finish what they had arranged to carry out, and the Council invited fresh tenders to complete the undertaking. The lowest of these was about £100,000 more than the original contract, allowing for work done previously. After lengthy consideration, the Corporation decided to complete the scheme themselves. The Council sat for three hours before coming to a decision, and ultimately confirmed the recommendation of the Water Committee that the work be proceeded with by administration. It was determined to appoint a manager to supervise the operations.

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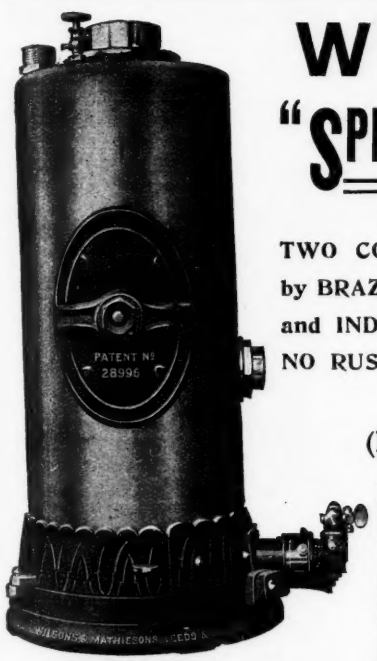

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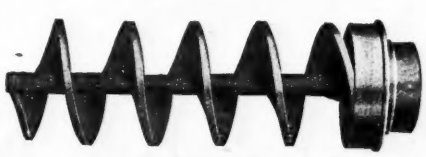

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COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is rather quieter—strikes at some Spanish ports lessening the quantities of coal sent there. In the steam coal trade, the demand is a little easier. Best Northumbrians are about 14s. per ton f.o.b; second-class steams are 12s. per ton; and steam smalls are from 7s. 6d. to 8s. 6d. per ton f.o.b, There have been a few sales of best steams for export over the shipping season. The gas coal trade is steady; but the home consumption is lower, with fairly good exports. Best Durham gas coals are about 13s. 4½d. to 13s. 9d. per ton f.o.b. for prompt delivery; second-class sorts are 12s. 6d. to 13s. per ton f.o.b.; and "Wear specials" are about 14s. per ton f.o.b., with a good inquiry. There is a demand for gas coals for some of the Mediterranean ports. Buyers look for concessions in price, however, which producers do not so readily give, so that forward sales are only slowly made. Some contracts also seem to be held over for similar reasons, though others are in course of close negotiation at a little below the current prices mentioned above. Coke is rather scarcer. Gas coke has been in demand—some heavy exports from the Tyne having been made in the last few days. Good gas coke is from 13s. to 13s. 6d. per ton f.o.b.

Yeovil Gas-Works Results.—The make of gas at Yeovil for the year ended March 31 amounted to close upon 88 million cubic feet—an increase of 5½ per cent., as compared with the preceding twelve months. There was a gross profit realized of £4800. The make of gas per ton of coal was 11,900 cubic feet. On March 31 there were 2768 meters in use, and 2078 cookers.

Co-Partnership at Croydon.—The Croydon Gas Company Co-Partnership Committee, in presenting their report for the nine months to March 31, state that, since the inception of the scheme 5¼ years ago, 800 co-partnership agreements have been entered into, and 172 have terminated, leaving 628 agreements in force. During the past nine months, £2306 had been invested by co partners through the scheme in stock of the Company, making a total to date of £8703. The savings for the 5¼ years amount to 44 per cent. of the total credited as bonus.

Woodall-Duckham Verticals for Bradford.—As the result of a series of visits of inspection, the Bradford Gas Committee have decided to recommend to the Council the acceptance of the tender of the Woodall-Duckham Vertical Retort and Oven Construction Company, for a complete installation of vertical retorts for the Birkshall Gas-Works, capable of carbonizing 420 tons of coal per 24 hours, and for the erection of a retort-house, coal and coke conveyors, bunkers, and screening plant, for the sum of £68,755. The Glover-West vertical retort is already in use at the Thornton Road works, and producing 2 million cubic feet of gas per day.

Brighouse Gas Department.

The annual report of the Brighouse Corporation Gas Department shows that the income for the past year has totalled £27,432, as compared with £27,610 for the previous year; but the expenditure has been only £18,022, against £18,989, leaving a balance of £9410, as compared with £8620. The sum of £1800 has been put aside for the relief of the rates. The amount of gas sent out from the works shows an increase of 6,298,000 cubic feet, or 3·86 per cent.; and the total gas sold increased by 4,766,600 feet, or 3·16 per cent. The unaccounted-for gas amounted to 12,344,400 cubic feet, or 7·29 per cent. An increase in the latter figure is largely accounted for by the growing consumption through slot-meters, the total revenue from which in the last quarter it is not practicable to bring into current year's working. The average make of gas per ton of coal was 10,870 cubic feet. The yield of residuals was well maintained, but has suffered by the fall in money value.

Automatic Lighting at Leeds.

The Leeds City Council have decided, on the recommendation of the Street Lighting Committee, to adopt, as an experiment, the automatic lighting and extinguishing of street-lamps. One hundred clockwork controllers and a similar number of wave-pressure controllers are to be installed, and the results of the two methods compared. The estimated expenditure is £19,000; but it is claimed that there will be a saving of £6000 a year in lamp lighting. There are already a small number of clockwork controllers in use in the city; and those responsible for the scheme urge that these have saved the ratepayers' money. It is, however, suggested that the wave-pressure system might save still more. Nothing is to be done in regard to the city as a whole until the results of the two systems have been carefully compared. Mr. R. Armitage, in criticizing the proposal, contended that the fixing of bye-passes to the lamps and sinking-fund charges would reduce the estimated saving from £6000 to £1500; and he added that if there was an improvement in the instruments during the period of installation, there might be a big loss. Alderman Ratcliffe replied that it was very necessary that some means should be adopted, in these days of fast traffic, by which the streets could be lighted when it became dark early or when there was fog.

The "Three Towns" Amalgamation Scheme.—At the time of the inquiry last February by the Local Government Board, into the application for a Provisional Order to amalgamate the three towns of Plymouth, Devonport, and Stonehouse, it was stated in the "JOURNAL" that if the Order was granted the Devonport Corporation would carry their opposition into Parliament. This forecast has proved correct; for the Local Government Board have granted the Order, and at a special meeting the Devonport County Borough Council have decided to oppose the matter in Parliament.

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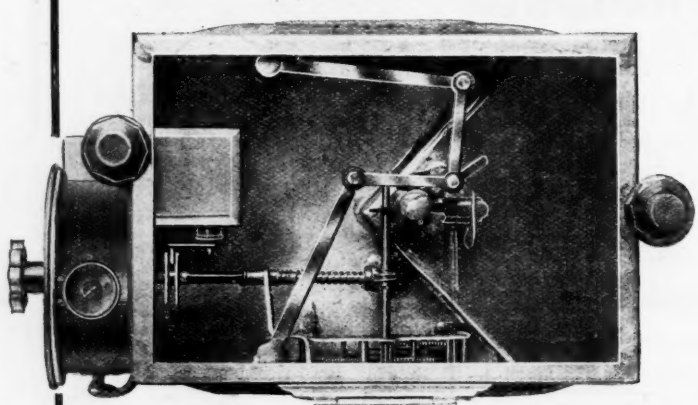

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West Bromwich Gas Undertaking.

At a meeting of the West Bromwich Town Council, last Wednesday, Alderman Blades referred to a clause in the Gas Committee's report with regard to the sales of gas for the past year, and said they would notice that, while there was an increase in the gas sold of something like 8½ million cubic feet, the increase in the gas-rental was only £56. He thought the public would expect some explanation of what he considered was a rather remarkable record. The price of gas was reduced by 2d. per 1000 cubic feet in October, 1912; so that for six months of 1913-4 the sales were charged at 2d. less than for the corresponding six months of 1912-3. This would have produced a decreased revenue of £1100 but for the increased output. The reduction in the price had benefited the gas consumers in the borough by over £2000 for the full year, as compared with the previous rate of charges.

Sales of Stocks and Shares.

The sale of gas and water stocks and shares conducted by Messrs. A. & W. Richards, at the Mart, Tokenhouse Yard, E.C., last Tuesday, included several new issues. By order of the Directors of the North Middlesex Gas Company, £8920 of 5 per cent. preference stock and 250 £10 additional ordinary shares were offered. The former realized from £105 10s. to £100 10s. per £100; and the latter (which are now receiving a dividend at the rate of £7 14s. per cent. per annum), £14 7s. 6d. to £14 5s. each. In the Felixstowe Gas Company, a new issue of £1500 of "B" additional ordinary stock (ranking for a standard dividend of 7 per cent., subject to the sliding-scale, equally with existing similar stock, the dividends on which for the past three years were at the rate of £6 6s. per cent. per annum), was disposed of at prices ranging from £111 to £110 per £100. Next, 20 £10 additional ordinary shares, part of a new issue, in the United District Gas Company were sold at par. These shares rank for a standard dividend of 7 per cent. per annum, subject to the sliding-scale, and are entitled, in view of the dividend now being paid on the original ordinary shares, to a *pro rata* dividend of £4 13s. 4d. per cent. per annum. By order of the Directors, 100 £10 new ordinary water shares in the Dunstable Gas and Water Company were offered. These will rank with existing similar shares, which are receiving the maximum dividend of 7 per cent. per annum; and they were sold at from £13 10s. to £13 per share. A further new issue consisted of £5000 of consolidated stock in the Bognor Gas Company (ranking for a maximum dividend of 7 per cent. per annum, with existing stock receiving £5 15s. per cent. per annum). The prices realized ranged from £105 10s. to £105 5s. per £100. Finally, 81 £5 fully-paid original shares in the Herne Bay Gas and Electricity Company (receiving 10 per cent. dividend) were sold at £9 7s. 6d. each; and 229 £5 fully-paid additional shares (7 per cent. dividend) realized £6 5s. to £6 2s. 6d. each. The Gosport Gas Company have increased their capital by £3500; and in the public competition the prices realized for the £2500 of 5 per cent. preference stock were from £10 12s. 6d. to £11 per £10. The £1000 of consolidated ordinary stock (upon which a dividend of £6 6s. has been paid during the last three years) sold for £12 5s. to £12 7s. 6d. per £10 share.

Wages and Hours of Metropolitan Water Board's Employees.—At the meeting of the Metropolitan Water Board last Friday week, recommendations were adopted of the Works and Stores Committee, increasing by £10,514 a year the wages of the engine staff, stokers, cleaners, turncocks, and coal wheelers, and reducing the hours of work from 72 to 66 a week, or 12 hours a day for 5½ days a week, to regular employees over 31 years of age, excepting in the rural districts.

Southport Water Board Meeting.—Alderman Griffiths, J.P., the Chairman of the Southport, Birkdale, and West Lancashire Water Board, presided over the annual meeting last week, at which the balance-sheet was presented. The Board felt, he said, very great satisfaction that the decrease in the amount of the precept required was larger than they expected. Last year the deficiency on the precept was £14,509; and this year it was £11,231—equal to a 1½d. rate. A member of the Board said they could not possibly have achieved such excellent results without the loyal co-operation of the Resident Engineer (Mr. G. H. Abbott), and his excellent staff.

Reduction in Price at Carnarvon.—In view of the fact that there was a profit on the past year's working of the gas undertaking of £674, the Carnarvon Gas Committee recommended, and the Town Council agreed, that the price of gas should be reduced 3d. per 1000 cubic feet—making it 3s. 6d. for lighting and 3s. for power. Prepayment consumers are to have an equivalent discount allowed them. Alderman Parry (the Chairman of the Committee) said he expected the whole of the capital expenditure on the works would be paid in twelve years; but he thought it would be more equitable for the present generation of ratepayers if the period for the repayment of the loan could be extended. Mr. Richards heartily congratulated the Council upon the prosperous condition of the gas undertaking. He said that the production of gas was over 3 million cubic feet more than in the year immediately preceding the installation of the electric light.

Water Supplies and the Standardization of Fittings.—At the annual dinner of the Sheffield master plumbers, Mr. W. Terrey, the General Manager of the Sheffield Corporation Water-Works, referred to the question of the standardization of water fittings, and expressed the hope that the Sheffield Water Department would become one of the testing centres, in which event no fittings would be allowed to be used in buildings unless they bore the official stamp. He pointed out, however, that many difficulties stood in the way of adopting uniform specifications of fittings for all parts of the world. The recent trouble in Nottingham [referred to in the "JOURNAL" some weeks ago] was a case in point. While the highly silicated waters which for years the authorities in that town had pumped from the red sandstone were suitable for their type of small-bore iron pipes and iron cylinders and boilers, the recent supply of soft water from the Derwent had introduced fresh factors which the friends of standardization could not afford to ignore.

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Oldbury Council and the Late Mr. Meiklejohn.—At the last meeting of the Oldbury District Council, Mr. Beach proposed a resolution expressing sympathy with the family of the late Mr. Charles Meiklejohn, of Rugby, who was formerly Manager of the Oldbury Gas-Works. Mr. Tomlinson, who seconded, said he was always convinced that Mr. Meiklejohn would make his mark in the gas profession. The resolution was carried in silence.

Stalybridge Gas-Works and the Rates.—During a discussion on the estimates of the Stalybridge Town Council, it transpired that last year the Gas Committee estimated that they would be able to provide £2000 out of their profits in relief of the rates; but, as a matter of fact, they were only able to hand over £1500. The other £500 would be contributed this year. Beyond this, they were to get nothing from the gas-works in relief of rates during the coming year.

Profits from Gas and Electricity.—Speaking recently at the official inspection of new machinery installed at the Dewsbury Electricity Works, Mr. J. E. Kilburn (the Chairman of the Electricity and Tramways Committee) said that the Electricity Department could not hope to compete with the gas undertaking in regard to the production of profits for the relief of the rates. At the electricity works, coal was used solely for the production of energy, and only 15 to 18 per cent. of its value could be utilized; whereas at the gas-works the Engineer obtained not only gas, but also coke and other bye-products.

Vertical Retorts for Truro.—The first installation of vertical retorts n Cornwall is to be made at Truro. An extension of the plant has become necessary; and on the advice of their Engineer (Mr. S. Ingram), the Directors of the Company have decided to build a new retort-house and erect vertical retorts capable of producing 300,000 cubic feet of gas per day. The order has been placed with Messrs. Leech, Goodall, and Co., of Leeds. The question of a new coal-store on the Company's quay on the bank of the River Fal is also under consideration. The idea is to instal plant for the more rapid and economical discharge of colliers and the storage of the coal, and so save expense.

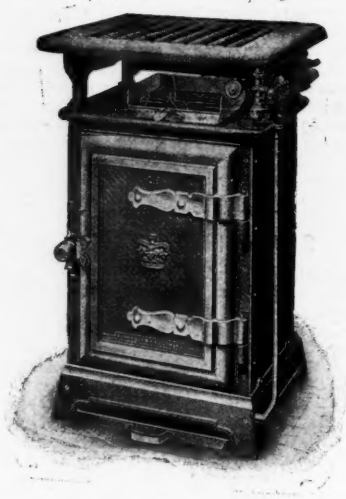
Gas Matters at Stoke-on-Trent.—The Stoke-on-Trent Gas Committee have resolved that a grant be made to Mrs. Jones, widow of the late Mr. E. Jones, the Gas Engineer at Burslem, equal to the amount of salary that would have been due to Mr. Jones for the remainder of the period of the three months' leave of absence allowed him by the Committee. It has also been determined that from the period that the salary ceases to be paid to Mrs. Jones the Burslem Gas-Works be charged with the payment of the salary of Mr. R. Surtees, at the rate of £350 per annum; and that the Longton and Fenton Gas-Works be charged with the payment of Mr. W. Langford's salary in proportion to the quantity of gas manufactured at these works.

Nottingham Gas-Workers' Organization.—Members of the Nottingham Gas-Workers' Union participated in a large demonstration on Sunday week, when Mr. Will Thorne, M.P., was the principal speaker in the Great Market Place. The assertion was also again made, in relation to the recent dispute affecting the tinsmiths employed at the meter repairing depôt of the Corporation, that there had been unnecessarily harsh treatment of members of the Union. A militant policy was foreshadowed in regard to contesting many of the municipal wards of the City at the next elections. No specific ground of grievance as to the general body of gas workers in the city was presented; Mr. Thorne being silent in this respect, as was also Mr. Arthur Hayday, who acts as local Secretary of the Union.

Keighley and the Use of Gas in Industry.—The Keighley Town Council have approved a recommendation of the Gas Committee that gas be supplied for engineering industrial purposes, other than lighting, at charges graduating from 1s. 6d. per 1000 cubic feet in the borough and 1s. 9d. outside for an annual consumption of between 1 million and 2 million cubic feet, to 1s. 2d. in the borough and 1s. 5d. outside for a consumption of over 9 million feet. It was explained that these reductions had been rendered necessary by the unsatisfactory state of the sales of gas during the past twelve months, the competition of electricity, the mild winter, and the adoption of more economical gas appliances. As this all tended in the direction of increasing the charges for lighting purposes, the Committee had decided to enter the industrial field.

Crowborough District Gas Company.—The report of the Directors adopted at the fifteenth annual general meeting of the Company stated that the demand for gas continued to increase satisfactorily; and it was proposed to issue a further £2000 of 5 per cent. debentures. The Directors went on to say they "regret that their Manager and Secretary, Mr. Irwin A. Cook, disappeared on Feb. 14, 1914; and a close examination of the books by the Auditors disclosed defalcations exceeding the amount of the fidelity guarantee. This was a great surprise, as they had every confidence in their officer." They appointed in his place Mr. A. G. Cheal. The profit on the revenue account for the nine months to Dec. 31 amounted to £999; and the amount brought forward made the total sum available £4148. A dividend for the nine months at the rate of 3½ per cent. per annum was declared—leaving a balance of £2746 to be carried forward. The Chairman (Mr. Andrew Dougall) pointed out that it had been determined to make the Company's working year end at December, instead of March as hitherto.

Gas and Electricity at Todmorden.—At the last meeting of the Todmorden Town Council, the report of the Electrical Engineer disclosed a loss for the year ended March 31, and it was decided that a sum equal to the loss and capital outlay on the department be transferred from the Gas Department. The Gas Department recommended that the Finance Committee be informed that it was anticipated that the loss and capital outlay for which borrowing powers were obtained in connection with the Electricity Department for the year ending March, 1915, would be borne by the Gas Department. In comparing the annual figures of the Council's gas and electricity undertakings, Alderman Lord stated with regard to the former that, with the balance brought forward from last year, the total excess of receipts over expenditure was £5448, though the net profit had decreased from £1377 to £1093. So far as the Electricity Department was concerned, there was a deficit of £1331 on the current revenue account. The gas undertaking had provided £5281 out of profits for utilization in the Electricity Department.



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The PARKINSON STOVE Co., Ltd.,
BIRMINGHAM AND LONDON.

Stone Gas-Undertaking.—At the last monthly meeting of the Stone District Council, it was decided to ascertain from the Gas Company whether they were prepared, on their Bill receiving the Royal Assent, to negotiate immediately with the Council with a view to arriving at a provisional purchase figure, and with this object to give facilities for an expert to examine the works and undertaking in order that he might advise the Council as to such figure.

The Vertical Retorts at Macclesfield.—In moving the adoption of the minutes of the Gas Committee by the Macclesfield Town Council, Alderman Isherwood stated that the new Glover-West vertical retorts had been handed over in perfect order by the Contractors. The results of the system were far superior to what had been expected by the Committee when they placed the contract. The retorts to-day were producing richer gas than had ever been produced with the old retorts. The past year had been a record one in the matter of consumption and manufacture. Nearly 10 million cubic feet more gas had been made than in the preceding twelve months; and if the consumption continued to increase at the same rate, the works would not be able to turn out all the gas required in another year's time. Since the Newbigging family had taken over the management of the undertaking, the works had been very successful.

At their last meeting, the Pontefract Town Council, approved a recommendation of the Gas Committee that after June 30, subject to the payment of the cost of fitting, to be made at the time, gas-cookers, the cost of which does not exceed £3 10s. each, be supplied rent free. There are nearly 3000 gas consumers, and about 300 have gas-cookers.

We have received from Messrs. E. G. Appleby and Co. a pamphlet containing illustrated particulars of the Kerpely revolving grate gas-producer and other steel-works plant for which they are contractors. The firm's increased business has necessitated the removal of their offices to more extensive premises at No. 12, The Broadway, Westminster, S.W.

In an earlier column the death is announced of Mr. J. G. Watkinson, of the firm of Messrs. J. & W. B. Smith, of Farringdon Road. We learn that there will be no change in the business as the result of Mr. Watkinson's death, as the responsibilities of management will be undertaken by his brother, Mr. Frederick Watkinson, who has been acting manager for the past five years, and previously (as will no doubt be remembered by most of the firm's customers) their representative. As a matter of fact, arrangements were, we understand, in progress for the retirement of Mr. J. G. Watkinson, and for his brother to take over the entire control as from the 1st ult.

GAS COMPANIES IN THE STOCK EXCHANGE.

The slight rally which made its welcome appearance in Capel Court the week before last was quite played out by the close; and the week which was concluded on Saturday was a period of persistent and unrelieved depression. Every factor at home and abroad was adverse. Mexican and Brazilian affairs in the Western world, financial pressure and political anxieties on the Continent, and our own domestic Ulster trouble now supplemented by a bewildering Budget, made up an array of miseries which effectually crushed markets. As to prices, it is hard to say what their real figures may be, for most dealers preferred not to make any price at all when stuff was being thrust upon them. Consols were perhaps fortunate in getting off with a loss of $\frac{5}{8}$ in the week. Business opened rather gloomily on Monday; and so it remained until near the close, depressed by Continental liquidation. Government issues were weak, and Consols fell $\frac{1}{4}$ for money. Rails were lower throughout, and American irregular. Tuesday found Paris selling heavily, and shrank accordingly, but recovered a bit when selling ceased. Consols were depressed by the Budget depletion of the sinking fund, and fell $\frac{1}{4}$ for the account. Rails were lower on the whole, and Transatlantics oscillated strongly. The Foreign Market was calmer. Markets continued dull and heavy on Wednesday; Continental selling and other destructive agencies being at work, and allowing only a feeble ray of light to peep out in odd corners. Government issues were weak; but Consols did not move. Rails managed one or two mild advances; but the rest in general were dull. Heaviness was continued on Thursday, and business was almost at a standstill, except for the never-ending realizations. Government issues were very dull, and Consols were $\frac{1}{4}$ lower. Rails sympathized fully. Transatlantics were hove down by Wall Street operations, and Foreigns were weak. Friday was a wretched day, and the tightening of money became a potent factor. Consols fell $\frac{1}{8}$, and not a market had a bit of backbone in it. Saturday closed an unhappy week. Consols touched $74\frac{7}{16}$, and closed at $74\frac{1}{2}$ to $74\frac{3}{4}$. General weakness characterized all the leading departments. In the Money Market, rates steadily hardened, and closed very firm. Business in the Gas Market was a bit more brisk, and some of the less frequently seen issues emerged into notice. A gratifying feature was that our special market showed no disposition to sympathize in the weakness affecting others. In Gas Light and Coke issues, the ordinary was pretty busy and firm; all transactions ranging from $101\frac{1}{8}$ to $102\frac{1}{4}$. In the secured issues, the maximum changed hands at 77, the preference at $97\frac{1}{4}$ and $98\frac{3}{4}$, and the debenture at $74\frac{1}{4}$ and $74\frac{3}{4}$. South Metropolitan were rather quiet at somewhat higher prices—$109\frac{1}{4}$ to $110\frac{3}{4}$. In Commercials, the 4½ per cent. fetched $106\frac{1}{2}$ and 107. Among the Suburban and Provincial group, Bournemouth preference realized $13\frac{7}{8}$, British $44\frac{1}{8}$ to $44\frac{3}{8}$, ditto debenture 90, Brighton ordinary 155, Ilford $152\frac{3}{4}$ and $153\frac{3}{8}$, North Middlesex 14 (a rise of 1), Portsea "B" $130\frac{1}{2}$ and 131 (a rise of 1), South Suburban 114 and 115, ditto preference 110, ditto debenture $113\frac{1}{2}$, Tottenham "B" $115\frac{1}{2}$, Wimbledon 117, and (on the local Exchange) Sheffield "B" and "C" 223—a rise of $\frac{1}{2}$ each. In the Continental companies, Imperial was 1 lower at $170\frac{1}{2}$ and 169, ditto debenture marked 85, Union 82, European $18\frac{1}{8}$ and $18\frac{1}{2}$, and Malta $4\frac{3}{8}$. Among the undertakings of the remoter world, Bombay was done at $5\frac{15}{16}$ to $6\frac{1}{16}$, Melbourne at 99, Monte Video at $12\frac{1}{16}$, Oriental at 123, Primitiva at $6\frac{1}{32}$ to $6\frac{1}{4}$, and ditto preference at 5 to $5\frac{1}{8}$.

OFFICIAL QUOTATIONS AT THE CLOSE OF THE WEEK.

Bank Rate (fixed January 29), 3 per cent. Last year, $4\frac{1}{2}$ per cent. Consols, $74\frac{1}{2}$—$74\frac{3}{4}$. Previous week, 75—$75\frac{1}{2}$.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	61—66	..	3 15 9
374,000	,,	Jan. 15	4	Do. 4 p.c. Deb.	78—81	..	4 12 9
280,000	5	April 29	7½	Bombay, Ltd.	5⅞—6⅜*	..	5 17 8
50,000	10	Feb. 26	16	Bournemouth Gas & Water { 10 p.c.	29—30	..	5 6 8
352,500	10	,,	7	B 7 p.c.	14½—15	..	4 13 4
75,000	10	,,	6	Pref. 6 p.c.	13½—14	..	4 5 9
380,000	Stk.	Feb. 26	14	Brentford Consolidated	260—265	..	5 5 8
330,000	,,	,,	11	Do. New	204—209	..	5 5 3
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111	..	4 10 1
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	207—212	..	5 3 9
244,200	,,	,,	8	Do. A Ord. Stk.	153—158	..	5 1 3
530,000	20	Mar. 26	12½	British	44—45	..	5 11 1
120,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. Stk.	90—92	..	4 7 0
245,771	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	89—91	..	4 7 11
100,000	10	,,	—	Cape Town & Dis., Ltd.	1—2	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	2¾—4¼	..	—
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	73—78	..	5 15 5
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	106½—108½	..	4 12 2
1,513,280	Stk.	Feb. 12	5/3/4	Commercial 4 p.c. Stk.	106—108	..	5 1 2
560,000	,,	,,	5½	Do. 3½ p.c. do.	103½—105½	..	5 1 1
475,000	,,	Dec. 11	8	Do. 8 p.c. Deb. Stk.	71—73	..	4 2 2
800,000	Stk.	,,	4½	Continental Union, Ltd.	80—83	..	5 8 5
200,000	,,	,,	7	Do. 7 p.c. Pref.	117—122	..	5 14 9
492,270	Stk.	—	6	Derby Con. Stk.	123—125	..	4 16 0
55,000	,,	—	4	Do. Deb. Stk.	102—104	..	3 16 11
1,002,180	10	Jan. 15	10	European, Ltd.	18—18½	..	5 8 1
16,386,660	Stk.	Feb. 12	4/17/4	Gas { 4 p.c. Ord.	101—103	..	4 14 7
2,600,000	,,	,,	8½	Light { 3½ p.c. max.	76—79	..	4 8 7
4,062,235	,,	,,	4	and { 4 p.c. Con. Pref.	96—99	..	4 0 10
4,674,850	,,	Dec. 11	3	Coke { 3 p.c. Con. Deb.	73½—75½	..	3 19 6
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87—89	..	5 13 4
70,000	10	April 29	11	Hongkong & China, Ltd.	163—163*	..	6 11 4
131,000	Stk.	Mar. 12	7⅝	Ilford A and C	151—154	..	4 19 0
65,780	,,	,,	6⅛	Do. B	115—118	..	5 3 10
65,500	,,	Dec. 30	4	Do. 4 p.c. Deb.	94—93	..	4 3 4
4,940,000	Stk.	Nov. 13	9	Imperial Continental	169—174	−1	5 3 5
1,235,000	Stk.	Feb. 12	8½	Do. 3½ p.c. Deb. Red.	84—86	..	4 1 5
200,242	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119—121	..	5 7 6
561,000	Stk.	Feb. 26	10	Liverpool United A	211—213	..	4 13 11
718,100	,,	,,	7	Do. B	143—145	..	4 16 7
306,083	,,	Dec. 30	4	Do. Deb. Stk.	99—101	..	3 19 3
63,480	Stk.	Dec. 30	3	Maidstone 3 p.c. Deb.	65—67	..	4 9 7
75,000	5	Dec. 11	6	Malta & Mediterranean	4⅜—4⅞	..	6 3 1
250,000	100	April 1	4½	Met. of Melbourne { 4½ p.c. Deb.	98—100	..	4 10 0
541,920	20	Nov. 27	4	Monte Video, Ltd.	11⅞—12⅜	+⅛	6 9 4
1,775,892	Stk.	Feb. 26	4½	Newc'tle&G'tesh'd Con.	99—100	−¼	4 10 0
529,705	Stk.	Dec. 30	8½	Do. 8½ p.c. Deb.	83½—84½	..	4 2 10
55,940	10	Feb. 26	7/14.0	North Middlesex 7 p.c.	13½—14½	+1	5 6 2
300,000	Stk.	Nov. 27	8	Oriental, Ltd.	120—125	..	6 8 0
60,000	5	Mar. 26	10	Ottoman, Ltd.	7¼—7¾	..	6 9 0
60,000	50	Feb. 23	13	Portsea, Island B	128—131	+1	4 19 3
100,000	50	,,	12	Do. C	118—121	..	4 19 2
249,980	5	April 29	8	Primitiva Ord.	6—6⅛*	..	6 3 1
499,960	5	Dec. 20	5	,, 5 p.c. Pref.	5—5⅛	..	4 15 8
521,600	100	Dec. 1	4	,, 4 p.c. Deb.	93—95	..	4 4 3
346,198	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	87—89	..	4 9 11
150,000	10	April 8	6	San Paulo { 6 p.c. Pref.	10⅜—11⅛	..	5 6 8
125,000	50	Jan. 2	5	5 p.c. Deb.	48—50	..	5 0 0
135,000	Stk.	Mar. 12	10	Sheffield A	223—224	..	4 9 3
209,984	,,	,,	10	Do. B	222—224	+½	4 9 3
523,500	,,	,,	10	Do. C	222—224	+½	4 9 3
90,000	10	Oct. 15	7½	South African	11—12	+½	6 5 0
6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	109—111	..	4 18 6
1,895,445	,,	Jan. 15	3	Do. 3 p.c. Deb.	73—75	..	4 0 0
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157—159	..	5 6 11
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116	..	5 3 5
60,000	,,	,,	5	Do. 5 p.c. Pref.	110—112	..	4 9 3
117,058	,,	Dec. 30	5	Do. 5 p.c. Deb. Stk.	113—115	..	4 6 11
629,740	Stk.	Nov. 13	5	Southampton Ord.	101—104	..	4 16 2
120,000	Stk.	Feb. 12	7⅜	Tottenham { A 5 p.c.	135—138	..	5 6 10
543,940	,,	,,	5⅝	District { B 3½ p.c.	115—117	..	5 0 5
149,470	,,	Dec. 30	4	{ 4 p.c. Deb.	89—91	..	4 7 11
182,380	10	,,	5	Tuscan, Ltd.	5—6	..	8 6 8
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	95—97	..	5 3 1
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½—110½	..	4 10 6
				Wandsworth, Wimbledon, and Epsom—			
30,000	Stk.	Feb. 26	8⅜	Wandsworth A 5 p.c.	151—156	..	5 7 4
255,696	,,	,,	6⅛	,, B 3½ p.c.	129—134	..	5 2 7
108,075	,,	,,	5/17/8	,, C 3½ p.c.	110—115	..	5 2 0
352,000	,,	,,	6½	Wimbledon 5 p.c.	117—122	..	5 0 5
98,000	,,	,,	6⅝	Epsom 5 p.c.	121—126	..	5 5 2
88,416	,,	Dec. 30	3	3 p.c. Deb. Stk.	71—73	..	4 2 2

Prices marked * are "Ex Div."

The Swinton and Mexborough Gas Board have reduced the charges for gas for power uses to 2s. 6d. per 1000 cubic feet.

The Welsbach Light Company, Limited, have forwarded a copy of a new issue of the illustrated price list of their gas-grillers, rings, cookers, hot-plates, &c.

The proposed purchase of the Isle of Wight Water Company by the Shanklin Rural District Council has again been brought forward. The Council have invited the Company to re-state their terms of purchase.

The Keighley Town Council, having considered tenders for the construction of the new Lower Laithe reservoir, with filter-beds, &c., in the Sladen Valley, agreed to accept the offer of Messrs. Morrison and Mason, of Glasgow, to carry out the work at a cost of £150,028.

Last Friday afternoon, the "Fairyland" Grotto Railway, situated on Central Beach, Blackpool, together with four lock-up shops in an adjacent street, was completely destroyed by fire, supposed to have been caused by the fusing of an electric cable.

A new bowling-green at the Luton works of the Davis Gas-Stove Company, Limited, was opened recently; Mr. H. N. Davis presiding at the ceremony. It was stated that the Company have defrayed the cost of laying the green, which amounted to about £250; and that they are letting it to the Bowling Club at a fair rental.

The Directors of the South African Lighting Association, Limited, have resolved to pay on May 27 a final dividend of 5½ per cent., less income-tax at 1s. 2d. in the pound, for the half year ended Dec. 31. This dividend, together with the interim dividend of 3½ per cent. paid last October, will make 9 per cent., less income-tax, for the year 1913.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER SUPERINTENDENT (Gas Plant). No. 5876.
DRAUGHTSMAN. Alexander Wright and Co., Westminster, S.W.
CARBONIZING FOREMAN (Chile). J. Lumsden, 29, Cornhill, E.C.
MAN FOR MAINTENANCE WORK. Ormskirk Gas Company.
WATER-FITTER. Bicester Urban District Council. Applications by May 15.

Appointments, &c., Wanted.

REPRESENTATIVE (New Zealand). No. 5878.

Gas-Works Wanted.

"D. G.," c/o Scripps's Advertising Offices, 13, South Molton Street, W.

Plant, &c. (Second Hand), for Sale.

CONDENSERS, SCRUBBERS, PURIFIERS, WASHER, GOVERNOR, GASHOLDERS, &c. Metropolitan Asylums Board. Tenders by May 20.
DOWSON GAS PLANT. A. Kenrick and Sons, West Bromwich.
RETORT BENCH IRONWORK. Hampton Court Gas Company.

Sales of Stocks and Shares.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY. London Mart. May 26.
DORKING GAS COMPANY. London Mart. May 19.
DORKING WATER COMPANY. London Mart. May 19.
FELIXSTOWE AND WALTON WATER COMPANY. London Mart. May 26.
HAYWARDS HEATH GAS COMPANY. London Mart. May 19.
LIMPSFIELD AND OXTED WATER COMPANY. London Mart. May 26.
SOUTH SUBURBAN GAS COMPANY (WEST KENT). No. 5877.
SOUTHEND GAS COMPANY. London Mart. May 26.
WANDSWORTH, &c., GAS COMPANY. London Mart. May 19.

TENDERS FOR

Bye-Products.

WARRINGTON GAS DEPARTMENT. Tenders by May 23.

Coal.

BRIDGNORTH GAS DEPARTMENT. Tenders by May 16.
CLONMEL GAS DEPARTMENT. Tenders by May 27.
GLOUCESTER GASLIGHT COMPANY. Tenders by May 30.
ISLE OF THANET GAS COMPANY. Tenders by May 21.
LEIGH CORPORATION. Tenders by May 18.
OMAGH GAS DEPARTMENT. Tenders by May 27.
RHYL URBAN DISTRICT COUNCIL. Tenders by May 27.
RICHMOND TOWN COUNCIL. Tenders by May 22.
SHREWSBURY GAS COMPANY. Tenders by May 22.
TIVERTON CORPORATION. Tenders by May 30.
WARRINGTON GAS DEPARTMENT. Tenders by May 23.
WESTON-SUPER-MARE GASLIGHT COMPANY. Tenders by June 1.

Condensing, Exhausting, and Purifying Plant, &c.

SIDMOUTH URBAN DISTRICT COUNCIL. Tenders by May 22.

Cookers, Fires, &c.

WARRINGTON GAS DEPARTMENT. Tenders by May 23.

Fire Clay Goods.

WARRINGTON GAS DEPARTMENT. Tenders by May 23.

Gas Fuel.

TYLDESLEY URBAN DISTRICT COUNCIL. Tenders by May 25.

Gasholders and Tanks.

GOUROCK TOWN COUNCIL. Tenders by May 26.
MARKET HARBOROUGH GAS DEPARTMENT. Tenders by May 22.

General Stores (Brass Goods, Taps, Cocks, Valves, Ironmongery, Castings, Bricks, Flexible Tube, Glass, Iron and Steel, Compo. Pipe, Oils and Paint, Drysaltery, Vitriol, &c., &c., Benzol).

DARWEN GAS DEPARTMENT. Tenders by May 23.
LEIGH CORPORATION. Tenders by May 18.
SIDMOUTH URBAN DISTRICT COUNCIL. Tenders by May 22.
TYLDESLEY URBAN DISTRICT COUNCIL. Tenders by May 25.
WARRINGTON GAS DEPARTMENT. Tenders by May 23.

Lighting Goods (Lamps, Fittings, Mantles, &c.).

WARRINGTON GAS DEPARTMENT. Tenders by May 23.

Meters and Prepayment Installations.

SIDMOUTH URBAN DISTRICT COUNCIL. Tenders by May 22.
TYLDESLEY URBAN DISTRICT COUNCIL. Tenders by May 25.
WARRINGTON GAS DEPARTMENT. Tenders by May 23.

Oxide.

SALFORD GAS DEPARTMENT.

Pipes, &c.

CHORLEY CORPORATION. Tenders by May 19.
DARWEN GAS DEPARTMENT. Tenders by May 23.
LEEDS GAS DEPARTMENT. Tenders by May 16.
LEIGH CORPORATION. Tenders by May 18.
SIDMOUTH URBAN DISTRICT COUNCIL. Tenders by May 22.
TYLDESLEY URBAN DISTRICT COUNCIL. Tenders by May 25.
WARRINGTON GAS DEPARTMENT. Tenders by May 23.

Tar.

GAINSBOROUGH GAS DEPARTMENT. Tenders by May 23.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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Resists 4500° Fahr. Best for GAS-WORKS.
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SALISBURY HOUSE, LONDON WALL, E.C.
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TO GAS AND WATER OFFICIALS.
BEFORE Purchasing your 1914 Cycle kindly send post-card for our CATALOGUE, Cash or gradual Payments. Speciality, Slot-Meter Copper Collector. MELROSE CYCLE CO., COVENTRY.

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